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The Stem Rust Epidemic of 1935 in Nebraska

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THE STEM RUST EPIDEMIC OF 1935 IN NEBRASKA 1/

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The Prologue

A succession of dry years culminating in the disastrous drought of 1934, depleted soil moisture reserves to the lowest ebb in the history of agriculture in Nebraska. Although sufficient precipitation occurred in September of 1934 to moisten the top soil to a point favorable for planting and subsequent germination of fall-seeded grains, in all but the western third of the State it was deficient throughout the winter and early spring. From October, 1934, through March, 1935, and in some localities even into April, rainfall was much below normal and together with an unusual amount of drifting soil, conditions were very unfavorable for over-wintering and normal development of winter grains. On the other hand, during the usual seeding period for spring small grains temperatures were below normal, so much so that seeding was unseasonably delayed, while the spring development of winter grains was inhibited to a large extent.

The combinations and sequence of factors, including poor seed stocks, lack of soil moisture for normal fall growth in some localities, a warm, open winter, soil drifting and blowing (particularly in the southern and western parts of the State), excessive pasturing, delayed spring development due in part to lack of soil moisture, and a cold, wet April and May, all contributed to the delayed heading of winter grains. Similarly, a dry March and a cold, wet April not only delayed seeding of the poor seed available but inhibited their germination and subsequent development to a point that proved decidedly disadvantageous when first rust and later heat were encountered as the small grains were maturing. The set of factors enumerated above for both winter and spring grains also resulted in some abandonment, lighter stands, and retarded development of the plants, additional factors which were reflected in part by the low resultant yields of all small grain crops.

1/ Paper No. 176 of the Journal Series of the Nebraska Agricultural Experiment Station.

By June 1 all small grains while delayed in their development, were making a rapid, lush growth and were in an excellent condition for stem-rust attacks in the eastern half of the State.

The Setting

Weather Conditions

Temperature departures for the State from the normal for January (+4.6 degrees), February (+8.5 degrees), and March (+6.5 degrees), totaled +19.6 degrees F., a rather striking figure, whereas precipitation for the same period was approximately 35 percent of the normal. In order to visualize this deficiency of precipitation, Figure 1 is presented primarily to point out the dry areas in the State. The weather for the first three months of 1935 can be classified as much warmer and drier than usual.

In contrast to these conditions, the temperature departure for April (-3.5 degrees) and May (-6.3 degrees) was -9.8 degrees, and the precipitation was about 159 percent of the normal. The precipitation for these two months alone in many localities approached the total rainfall for the entire year of 1934. The distribution of this unprecedented precipitation is shown in Figure 2. It will be noted that all parts of the State received a generous amount of rainfall during these two months.

It has been pointed out by Peltier 2/ that low temperature is a limiting factor in the development of primary stem-rust infection and subsequent development of uredia, whereas the lack of an even distribution of sufficient precipitation is the major inhibiting factor in the development of subsequent urediosporic generations. For this reason the weather for June and July will be presented by weekly intervals (Figs. 3, 4, 5, 6, 7, and 8).

The weather for the first week in June was characterized by mean temperatures ranging in the fifties over most of the State and by a moderate rainfall fairly well distributed over the entire State. Only in the south and southeastern districts were mean temperatures high enough to favor primary infection, although they were not optimum by any means.

During the second week in June, temperatures throughout the State were nearer optimum for primary infection and production of uredia, but rainfall was spotty and rather light at many points.

2/ Peltier, G. L. Relation of Weather to the Prevalence of Wheat Stem Rust in Nebraska. Jour. Agr. Res. 46: 59-73, 1933.

With the exception of some counties in the western end of the State, both temperatures and precipitation were exceedingly favorable for stem-rust infection during the entire third and fourth week of June, and, as will be pointed out later, it was during this interval that the stem-rust epidemic in Nebraska was in the making. Further, it was also in this period that strong southern winds prevailed for several consecutive days, which carried a profuse rust inoculum to all parts of the State. For the State as a whole, the weather in June was cool (2.6 degrees below normal) with about a normal rainfall (3.73 inches) and with more than normal-humidity conditions ideal for heavy infection and rapid development of many urediosporic generations.

Beginning in early July mean temperatures rose abruptly into the eighties and, with few exceptions in the western third of the State, remained at these points throughout the month. On the other hand, rainfall decreased and was very spotty. The month of July was warm (+6.3 degrees F.) and dry (2.0 inches below normal) with sunshine much above normal - conditions very unfavorable for the normal maturity of the delayed winter and spring grains. Thus while weather greatly favored stem-rust development during the last two weeks of June, it was decidedly unfavorable in July for maturation of all grains, so that shriveled and light kernels resulted to a large extent from a combination of stem rust and heat to produce low yields.

To summarize: The early growing season of 1935 was extremely erratic, the first three months of the year being much warmer and drier than usual, whereas April and May were cooler and wetter than normal. By June 1 all grains, although delayed in their normal development, were making a rapid and excessive growth, but these same conditions also favored infection and rapid development of progressive urediosporic generations of stem rust. It was during the last two weeks in June that the rust epidemic got under way in the eastern two-thirds of the State. July was hot and dry in this same area and while it inhibited further urediosporic generations, the heat hastened the abnormal ripening of the immature grains because of the great stress of excessive transpiration and deficient soil moisture. Thus stem rust and heat alone, or in combination, cut the yield of all grains throughout the State.

Relation of Weather to Host Development

There is no need, in the light of the climatic data presented, to dwell upon the delayed development of both winter and spring grains. Because of a sequence of factors, heading was delayed, ripening was late and the duration of the fruiting period lengthened. The only accurate data available to show this point are those obtained at Lincoln with Turkey Red winter wheat. For a comparison with the prevailing conditions in

1935, the lengths of the fruiting period for the stem-rust epidemic years of 1904, 1916, 1919, and 1920 were employed. In Table 1 the time of heading and ripening and the length of the fruiting period of Turkey Red winter wheat for the above-mentioned years at Lincoln are listed. The length of the fruiting period varies from four to five and one-half weeks, while in 1935 it was only one day short of five weeks. During this long interval, especially when abundant inoculum is at hand shortly after the plants head, it can be readily seen that many urediosporic generations can occur.

Table 1.-Seasonal variation in the time and length of the fruiting period of Turkey Red winter wheat for four years during which stem-rust epidemics occurred for comparison with that of 1935 at Lincoln, Nebraska.

Year	Date of heading	Date of ripening	Length of fruiting period
			Days
1904	June 4	July 13	39
1916	June 2	July 7	35
1919	June 3	July 3	30
1920	June 9	July 7	28
1935	June 4	July 8	34

To ascertain the influence of weather on the length of the fruiting period. the mean temperatures, total precipitation, and the number of rainy days for the actual period for the above-mentioned years are given in Table 2. During this period the mean temperatures were ideal for rust infection and rapid development. The total rainfall and the number of rainy days give an idea of the distribution of the rainfall. It will be noted that an even distribution over many days is quite essential for stem rust and in those years where this occurs, the stem rust epidemics have been more severe. Apparently the season of 1935 at Lincoln was the most favorable for rust of any epidemic year since 1904 in this respect.

The data listed for Lincoln, however, can not be considered typical of the whole State. Peltier 3/ has pointed out that if Nebraska were pivoted at the southeast corner and moved in a 90 degree angle to the north, the western part would lie in Minnesota. The altitude, moreover, increases at the rate of one foot for every seven miles westward across the State, so that with the exception of precipitation, conditions in the spring wheat area in northwest Nebraska are somewhat similar to those in the spring wheat area in Minnesota and the Dakotas. Hence in western Nebraska the Turkey Red winter wheat heads from 4 to 7 days and ripens from 7 to 14 days, later than at Lincoln, while the lengths of the fruiting period are intermediate between these two widely removed localities.

Table 2.-Influence of weather on the length of the fruiting period of Turkey Red winter wheat at Lincoln, Nebraska.

Year	Length of fruiting period	Mean temperature	Precipitation	Rainy Days
	Days.	°F.	Inches	Number
1904	39	69.2	6.85	21
1916	35	70.5	3.14	11
1919	30	75.7	3.74	11
1920	28	75.2	2.10	10
1935	34	71.9	4.15	14

Amount, Time of Appearance, and General Dissemination of Initial Inoculum

The drought and heat of 1934 prevented to a large extent the oversummering of the few teliospores produced on grains. These same conditions also inhibited the growth of volunteer wheat in the fall, so that only an occasional telium was found in late fall on volunteer grains and grasses.

3/ Peltier, G. L. Op. cit. (footnote 2).

Beginning in early April, 1935, barberry bushes in seven counties located in the eastern third of the State were systematically observed for the presence of aecia. During the course of several months no aecia were found on these bushes; in fact not a single bush was found in Nebraska during 1935 with either pycnial or aecial infection. Few, if any, barberry bushes were infected in 1935, although weather conditions favorable for sporidial infection were at hand. Apparently the limiting factor was the absence of viable teliospores. Little, if any, stem rust in Nebraska resulted from aecial infection but originated from a source other than the barberry.

No doubt as a result of an unusually warm winter in the southern grain-growing sections more than the normal number of urediospores over-wintered over an extended area in Texas. That urediospores reached southern Nebraska quite early in the season was confirmed by a series of slide exposures. Furthermore, the number of urediospores increased very rapidly during the latter part of May and the first week in June in areas where temperatures were high enough for primary infection to occur.

As early as the week beginning May 15 an average of 120 urediospores were caught on the slides during each of three 24-hour periods in Nuckolls County. Only a few spores were caught at points in the eastern third of the State as far north as Madison County (Fig. 9). To determine the number of spores falling per square foot over a 24-hour period, the number of urediospores found on the exposed slides should be multiplied by 48. The following week an average of 560 spores for each of two slide exposures were obtained in Nuckolls County, while only a few spores were caught occasionally as far north as Holt County (Fig. 10). By June 4 the concentration of urediospores in Nuckolls County had increased to an average of 2,136 spores per slide during each of two 24-hour exposures. In other words, urediospores were falling at the rate of over 100,000 per square foot, surely a tremendous number, yet in spite of this high concentration of spores only a few were collected at other points in the State north of Nuckolls County (Fig. 11).

During the week beginning June 5 a new concentration of spores was found in Seward and Lancaster Counties, while once again only a few spores were caught on the exposed slides to the north and west in the State (Fig. 12). The following week there was an increase in numbers of spores on the exposed slides in Lancaster and in Buffalo counties, as well as a slight increase in the western part of the State (Fig. 13). In the week beginning June 19, the spores collected on the exposed slides in Lancaster County averaged over 2,000 per slide. They also increased manyfold at a number of points in western Nebraska (Fig. 14). The following week a total of 34,929 spores were caught during five 24-hour exposures, or almost 7,000 spores per slide in Lancaster County, that is at the rate of approximately 335,000 spores per square foot. A high

concentration of spores was also found in Hitchcock County and it is quite apparent that they were well distributed in fairly large numbers throughout the western part of the State (Fig. 15). By the first week in July the slide exposures showed that the number of spores in western Nebraska increased almost ninefold over the preceding week (Fig. 16), and during the following week an average of 4,000 spores for each of four slide exposures were obtained in Box Butte County.

On the basis of the slide exposures it can be assumed that during the last two weeks in May a fairly large primary infection occurred and a subsequent high concentration of inoculum developed in Nuckolls County and possibly in the surrounding area, especially to the south and west where suitable temperature for primary infection prevailed. This area was apparently the focus for the rust inoculum, which progressively reached all sections of Nebraska. About June 5 another area of concentrated primary infection developed with Lancaster County as the center, which during the interval up to July 1 produced a large amount of inoculum. Local centers of rust concentration later developed in Buffalo, Hitchcock, Cheyenne Counties, and finally in Box Butte, where by the middle of the month, 24-hour slide exposures averaged 4,000 spores per slide or almost 200,000 per square foot in the last-named county.

During the second and third week of June there were at least four occasions when southerly winds prevailed, as a consequence of low-pressure areas advancing from the west of Nebraska. On June 23 and 24, because of two advancing low-pressure areas, one moving towards the spring-wheat area and the other approaching the winter-wheat belt, strong southerly winds prevailed over the entire Great Plains region, followed by generous amounts of precipitation throughout the area. It was at this time that the large concentrations of inoculum in south-central Nebraska and adjacent areas were distributed in a fan-shaped fashion to the north. This large amount of inoculum was sufficient to produce a widespread primary infection, heavy enough in itself to cause considerable damage to wheat, since ideal weather conditions prevailed and the grain plants were at the stage of development most receptive to rust infection in most areas of the State.

The first uredia were collected in Jefferson June 7, in Lancaster June 11, in Kimball July 1, and in Box Butte County July 6, although from evidence presented above, primary uredia probably developed earlier in Nuckolls and near-by counties. Mature uredia were first noted at Lincoln on June 11. If the weather data for a two-weeks period prior to this date are analyzed, it is found that the mean temperature was 62.5 degrees F. and the total precipitation was 3.41 inches, including 8 rainy days. While mean temperatures below the optimum prevailed for primary infection, other conditions were ideal.

The number of days from the first appearance of primary uredia to the ripening of winter wheat was 27, or 1 day short of 4 weeks, a rather long period. During this interval the mean temperature was 75.4 degrees F., the total rainfall was 6.52 inches, with 15 rainy days. The number of cloudy days and the relative humidity were both greater than normal for this same period--conditions ideal for the rapid development of secondary and succeeding urediosporic generations. In fact the weather was more ideal for rust infection during June of 1935 at Lincoln than at any time since stem rust investigations were initiated in 1920.

A study of the climatic data at North Platte and Scottsbluff reveals the fact that the weather was much more favorable for rust in 1935 than in 1923 when stem rust assumed epidemic proportions in western Nebraska, since both temperature and precipitation were above the normal. Rust epidemics in western Nebraska, like those in the spring-wheat areas of Minnesota and the Dakotas, are possible, other factors being favorable, only when temperatures are above the normal for July and the forepart of August. An even distribution of rainfall well above normal is also an essential prerequisite in western Nebraska. In contrast to these requirements a mean temperature somewhat below the normal during June and the forepart of July, together with ample rainfall well distributed are essential for rust epidemics in the eastern half of Nebraska. Thus the entire sequence and progression of factors necessary for a statewide stem-rust epidemic was at hand and they continued to favor the further development of stem rust in the eastern two-thirds of the State up until the first week in July, when hot, dry weather set in which not only inhibited the further spread of rust but stimulated the premature ripening of all small grains.

The Stem Rust Epidemic

Survey Methods:- In order to determine with some degree of exactness the severity of stem rust the following procedures were employed. Fieldmen entered into a grain field at least 3 or more rods, selected a representative area, and grasped within an arm's reach at least 50 or more stems which were cut off at the base. The prevalence and severity of stem rust were then checked with the U.S.D.A. standard scale for estimation of rust. Detailed notes of the stage of maturity, the presence of other disease, topography and other pertinent observations were made. The bundle of stems was given a number and sent to the plant-pathology laboratory, College of Agriculture, Lincoln. In this way upwards of 600 samples of wheat alone were collected in various parts of the State, as shown in Figure 17.

When all the samples were assembled one of the writers determined the varieties and the following data were obtained: the number of spikelets per head (average of 10 representative heads from each bundle), the number of kernels per head, the weight of 100 kernels from each sample, and the amount of kernel shriveling as determined from Plate 1, which was prepared from selected kernels of Cheyenne winter wheat. As the correlation between the severity of stem rust and the degree of shriveling was complicated by the effects of the heat in July, which hastened the premature ripening of all small grains, the data will be held in abeyance until a complete analysis can be made.

In order to check the data on stem rust severity, approximately 900 replies to a questionnaire were obtained from grain growers and more than 400 reports were received from grain dealers distributed over the State. It is one of the objects of this paper to compare and discuss the data on stem rust severity on the basis of these three distinct sources of information.

Results:- On the basis of the collections, the distribution of which is shown in Figure 17, Table 3 has been prepared listing the severity of stem rust by crop districts for the various grains. It will be noted that stem rust of rye (*Puccinia graminis secalis*) averaged less than 1 percent in severity and so far as this crop was concerned, no measurable damage occurred. As has been pointed out by Peltier 4/, with the continued eradication of the barberry, which is apparently the only source of rye stem rust in Nebraska, it is gradually disappearing. The fact that rye stem rust was scattered and very slight during the favorable season of 1935, indicates that the above interpretation is correct.

Only in the central district was more than 1 percent severity recorded of oats stem rust (*Puccinia graminis avenae*), and it is evident that for some reason or other inoculum was rather sparse and reached the State late in the season, so that, like rye, this crop escaped measurable losses in most parts of Nebraska. Barley, on the other hand, with few exceptions showed a severity of stem rust approaching that of winter wheat in some of the crop districts, indicating that barley was attacked almost exclusively by wheat stem rust (*Puccinia graminis tritici*).

4/ Peltier, G. L. Some aspects of the spread of stem rust. Zentbl. Bakt. (etc.) Abt. II, 78: 525-535, 1929.

Table 3.-Severity of stem rust in Nebraska (1935) by crop districts

Crop districts	Wheat		Oats		Rye		Barley	
	Collections	Stem rust severity	Collections	Stem rust severity	Collections	Stem rust severity	Collections	Stem rust severity
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Northwest	77	37	4	-1	1	T	8	37
North	6	27	-	-	1	T	-	-
Northeast	25	16	5	T	9	-1	11	3
Central	44	28	2	8	2	-1	5	19
East	191	26	22	-1	14	-1	6	8
Southwest	51	12	3	-1	3	-1	5	23
South	71	17	10	-1	4	-1	7	14
Southeast	98	7	19	-1	12	-1	2	9
Average	563	21	65	±1.5	46	-1	44	16

Naturally the greatest rust severity on wheat was found in the northwest crop district, since spring wheat is confined to a large extent to this area. The least stem rust occurred in the southeast district. A stem-rust severity greater than 25 percent was found in the east, central, and north districts and 17 percent or less in the crop districts bordering on the Kansas state line and in the northeast district, where wheat is not a major crop. In order that a more extensive view of the wheat stem rust situation may be obtained, the rust severity is listed by counties in Figure 18. Here again, it will be noted that rust was of minor importance in the southeastern, northeastern, and southwestern corners of the State, while it was quite severe in the east-central, central, and northwestern counties.

The progress of stem rust can almost be visualized across Nebraska by the degree of rust severity recorded on the matured grain. It will be recalled that a large concentration of inoculum was built up quite early

in the season in the south-central tier of counties, with Webster County as the center. This large concentration of spores served as a source of primary infection, first in the east-central counties and somewhat later in an area with Buffalo County as a center; and finally, with the southerly winds of June 23 and 24, inoculum was distributed throughout northern and western Nebraska to produce an extensive and heavy primary infection the first week in July. It is also evident from Figure 18 that the dissemination of urediospores from this source was in a fan-shaped fashion, since in the two southern corners only slight damage to wheat resulted from rust.

Only in the northwest district are both winter and spring wheat grown to any extent, although a few scattered fields of spring wheat are grown each year in eastern Nebraska. It is of interest to compare the rust severity in this area, not only on the two types of wheat but on the varieties commonly grown. Table 4 has been prepared to show such a comparison. The durum wheats showed the least rust severity (20 percent), the winter wheats followed closely (23 percent), and the spring wheats were most severely attacked (33 percent). Considerable differences in rust susceptibility between spring wheat varieties occurred. For example, Ceres, a supposedly resistant variety, showed more rust severity than Reward a commonly grown spring wheat, although the number of spikelets with kernels was 78 percent as against 64 percent for Reward and the average weight of kernels was also greater.

No appreciable differences in rust susceptibility were noted between hard red winter wheat varieties commonly grown in Nebraska, but they were less susceptible than the soft red winter wheats. It can be safely stated that no variety of wheat escaped rust and that the physiologic races prevalent in Nebraska during the 1935 season were able to infect all types and varieties of wheat to a varying extent since all durums, winter, and spring wheats, including Ceres, were collected in the State with varying amounts of stem rust.

In the questionnaire sent out to the grain growers, they were asked to indicate the amount of stem rust present on the stems of the grains under the following headings: None, trace, moderate, and heavy. The reports for both winter and spring wheats are shown in Figures 19 and 20. In the main, the heaviest amounts of stem rust were reported by the growers from the same areas that were observed by our fieldmen. Here again the trend was the same; a light infection occurred in the two southern corners and in the northeastern part of the State, while larger amounts of rust were reported from the east-central section, the central half, and the western third of the State. Attention is directed to the heavy amount of rust in the fields in south-central Nebraska, where large amounts of inoculum were built up early and which served as the source of primary infection for most of Nebraska. In the northwest district stem rust of winter wheat was present in every field

Table 4.- Relative severity of stem rust in the northwest crop district of Nebraska on various kinds of wheat.

Kind of wheat	Collections	Average severity of stem rust	Average spikelet per head	Average Kernels per head	Average kernels per spikelet	Average weight of 100 kernels
	Number	Percent	Number	Number	Percent	Grams
Winter wheats	18	23	32.8	25.1	77	2.10
Durums	5	20	33.0	27.1	82	2.00
Reward	22	38	34.2	22.1	64	1.34
Miscellaneous spring wheats	9	41	32.6	21.6	66	1.80
Dixon	5	51	32.8	22.8	70	1.00
Ceres	10	51	32.2	25.1	78	1.53
Java	4	56	31.2	22.5	72	1.66
All spring wheats	56	33	32.8	23.5	72	1.58

but one reported by the growers, and in most instances moderate to heavy amounts of stem rust were indicated. Only a few scattered fields of winter wheat escaped rust in this area, as can be noted in Figure 19. Stem rust on spring wheat was much more severe, being heaviest again in the northwest district. Not one report of a field of spring wheat free from stem rust was received from this area.

The growers for the most part indicated only a trace to no stem rust on oats, although here and there, primarily in the eastern half of the State, a moderate to a heavy infection was reported. A similar statement can be made for the prevalence and severity of rye stem rust, although even fewer reports of a moderate to heavy infection were received for rye. In other words, little or no measurable loss from rye stem rust was reported by the growers and although more oats stem rust was reported, the losses were slight. Stem rust on barley, however, was much heavier and many growers indicated a moderate to a heavy amount on this grain. It is quite apparent from these results that the wheat

stem rust was involved rather than rye stem rust. Thus, while nearly 900 reports from the grain growers reveal a heavier infection than found by our fieldmen, the trends are the same as in the distribution of stem rust severity on the various grains, although perhaps they accentuated their losses somewhat. At least the reports from the growers themselves served as a valuable adjunct in the stem-rust survey.

A somewhat more elaborate questionnaire was forwarded to the grain dealers through the cooperation of Mr. A. E. Anderson, Federal Agricultural Statistician for Nebraska. They were asked to report the average yield and test weight per bushel, the estimated loss in percentage from stem rust, and the percentage loss from the combination of hot, dry weather for the various grain crops. More than 400 reports were returned. Figure 21 not only indicates the location and distribution of the grain dealers but also the estimated combined loss in percentage from stem rust of winter and spring wheat. It will be seen that the trend of stem rust damage to wheat is similar to those already pointed out from two diverse sources. As in the data obtained from the grain growers, however, the estimated losses are somewhat accentuated. This fact is more clearly brought out in Figures 22 and 23, where the average yield in bushels, the estimated percentage loss from stem rust and the percentage loss from heat are listed by counties for winter and spring wheat, respectively.

Note the low yields of winter wheat in those areas where stem rust was most severe. The south crop district, with yields as low as 3 bushels per acre, as in Webster County, was the center of early infection. Increasingly larger yields were reported in the southern tier of counties, as distance from the center increased and in the two southern corners yields were fairly good and rust damage much lower. Throughout the remainder of the State yields were below normal. In general there is a correlation between yields and the extent of loss attributed to a combination of stem rust and heat, although in many instances the combined losses are intensified. It is apparent from Figure 23 that yields of spring wheat were extremely low, especially in the northwest district and, strange as it may seem, higher yields were obtained in the eastern third of the State where normally adverse climatic conditions and stem rust prevalence usually are unfavorable for the maturity of this crop. In other words, environmental conditions for stem rust were ideal in 1935 in northwestern Nebraska.

As in the case of the data collected by the writers and those reported by the grain growers, very little stem rust of oats was indicated and with the exception of a few localized areas, yields of around 30 bushels per acre were estimated by the grain dealers over the State as a whole. This same situation prevailed in northwest Nebraska and had inoculum of oats stem rust been prevalent in any amount, the severity of this rust would have been much greater in this area. Even less stem

rust of rye was reported by the grain dealers. Low yields in some instances, however, especially in the early season in the dry areas in the northwest and south districts, were listed. The estimated percentage of loss due to stem rust on barley was much higher than in either of the two above-mentioned cereals, and in some sections of the State the loss in barley approached the losses in winter wheat.

The data received from the grain dealers, then, supplemented in a large measure those obtained from the other two sources in indicating the relative prevalence and severity of stem rust on the small grains, although like the reports from the grain growers, there was a tendency to intensify the estimated loss due to stem rust. From the standpoint of survey methods, the three sources of information showed more or less the same trends in that they corroborated one another so far as the prevalence and severity of stem rust was concerned. Thus from the viewpoint of public and private crop disease reporting, all three sources furnished a picture of the stem rust epidemic in Nebraska.

In conclusion it can be stated that all three sources of information served to show the 1935 rust epidemic to be as severe as any previous epidemic in Nebraska. The primary source of this epidemic was the large amount of inoculum built up early in the south-central Nebraska and adjacent areas in Kansas, as the result of perhaps larger numbers than usual of wind-blown urediospores from the South. This inoculum was sufficiently large to produce a heavy primary infection throughout most of Nebraska. Further, no variety of either spring or winter wheat commonly grown in the State showed resistance to the prevailing physiologic races. Thus Kanred was apparently as severely rusted as Turkey Red and Ceres as Marquis or Reward.

The Hot, Dry Winds

The sequence of factors responsible for the delayed spring development of all cereal grains have already been enumerated, together with the fact that soil moisture reserves were at their lowest ebb at the time of spring seeding. Although mean temperatures for the first three months of the year were much above normal and precipitation was highly deficient as well, the following three months were characterized by mean temperatures below normal with precipitation much in excess of normal. Under the latter conditions the slow-starting grains were pushed rapidly during June into a heavy lush growth in the eastern half of the State and when the mean temperatures rose abruptly into the eighties in early July and precipitation declined rapidly, the plants soon depleted the scanty soil moisture and as a consequence the maturing grain suffered severely from a moisture deficiency. The heads did not fill and the kernels became shriveled, resulting in disappointing yields throughout most of Nebraska, even apart from the ravages of rust.

It is exceedingly difficult, of course, to determine the exact amount of shriveling due to stem rust and heat alone. A preliminary study, however, of the more than 600 samples of grain show that upwards of one-half of the shriveling can be accounted for by the weather, including insufficient soil moisture to carry on the normal development of the plants, aided by high temperatures and drying winds conducive to excessive loss of water from the top soil and the shallow-rooted plants. Likewise Figures 22 and 23 also reveal that the grain dealers in estimating the losses due to these conditions considered almost half of the losses in wheat to be due to hot, dry weather.

For the present the estimated amount of shriveling as reflected in part by the low yields and in part by the test weights due to hot weather, must be analyzed from the data at hand. In Table 5 are listed the stem-rust severity in percentage in the various small grains as determined by the writers and the yields in bushels per acre and the test weights in pounds per bushel as estimated by the grain dealers for the eight crop districts of Nebraska.

Low yields of rye in the northwest and south crop districts can be primarily attributed to the exceedingly dry winter in these areas, which was very unfavorable to the normal overwintering of this cereal. Further, no measurable loss from rye stem rust was recorded and since the yield of this crop was below normal and the test weights were also low, grading No. 2 or even less, these losses must be attributed almost entirely to the adverse conditions, including the hot, dry weather of July, 1935. This can be well illustrated by pointing out the low rye yields of 12 bushels per acre estimated for the northwest district, where the test weights averaged 54 pounds to the bushel as compared with yields averaging 23 bushels per acre and test weights of only 52 pounds to the bushel in the north district.

Since rye normally ripens somewhat earlier than winter wheat, rye did not receive the full effect of the heat as did winter wheat. The average winter wheat yield for the entire State was estimated by the grain dealers as 13 bushels per acre, whereas the average yield of rye was 5 bushels more per acre. Further, the test weights were the same for both crops, which again reflects the greater damage to winter wheat by the combination of both rust and heat. Even where stem rust damage was slight, yields were disappointing and test weights low, the wheat grading No. 3 or less, as in the southeast district. Other than in the northwest district, where stem rust was most severe, heat took its toll in all other parts of the State.

Barley, a spring-seeded crop, suffered still more severely from heat as reflected primarily in the low test weights over the entire State, the average being only 40 pounds per bushel. The effects of stem rust in reducing yields are apparent in the northwest and southwest districts, although so far as shriveling is concerned, heat was a more important factor than stem rust over the entire State.

Table 5.-The relative stem rust severity compared with the average yield per acre and pounds per bushel of the various small grains grown in the eight crop districts in Nebraska in 1935

Crop districts	Winter wheat			Spring Wheat			Oats			Rye			Barley		
	Stem rust severity a/	Yields per acre	Test weights per bu.	Stem rust severity	Yields per acre	Test weights per bu.	Stem rust severity	Yields per acre	Test weights per bu.	Stem rust severity	Yields per acre	Test weights per bu.	Stem rust severity	Yields per acre	Test weights per bu.
	%	Bu.	Lbs.	%	Bu.	Lbs.	%	Bu.	Lbs.	%	Bu.	Lbs.	%	Bu.	Lbs.
North-west	37	11	53	-	6	48	-1	32	32	T	12	54	37	20	37
North	27	15	52	-	8	47	-	29	27	T	21	54	-	25	39
North-east	16	14	51	-	9	46	T	36	27	-1	23	52	3	29	40
Central	28	12	53	-	9	50	8	33	27	-1	17	53	19	26	41
East	26	16	55	-	12	51	-1	35	26	-1	22	53	8	30	41
South-west	12	15	54	-	10	52	-1	31	29	-1	18	54	23	22	38
South	17	10	53	-	8	53	-1	27	27	-1	13	52	14	24	40
South-east	7	14	55	-	8	53	-1	29	25	-1	18	54	9	23	43
Average	21.0	13	53	-	9	50	±1.5	32	28	-1.0	18	53	16	24	40

a/ All wheats

Spring wheat yields averaged only 9 bushels per acre with a test weight of only 50 pounds per bushel for the entire State. As was to be expected spring wheat suffered a greater combined damage from stem rust and heat than any other of the small grains, since it is a late-maturing grain. Here again the damage of either one of the factors can be illustrated. In the northwest district, yields of 6 bushels to the acre of spring wheat testing 48 pounds to the bushel were obtained, where rust severity was found to be exceedingly high, as contrasted with yields of 9 bushels to the acre of wheat testing only 46 pounds to the bushel with rust severity less than half as great in the northeast district where heat damage was more pronounced.

The prevalence and severity of oats stem rust was somewhat spotted but on the whole it did relatively little damage since yields averaged 32 bushels per acre for the entire State.

Only in the northwest district, however, were the test weights up to normal and, as has been pointed out previously, it was in this section of the State that the least heat damage occurred in the other grains. Thus what measurable damage in oats occurred was due not primarily to stem rust but to heat and other adverse factors.

To summarize:- The damage occurring to rye in 1935 in Nebraska can be attributed solely to adverse weather conditions. In the case of oats upward of 90 percent of the lowered yields and low test weights can be attributed to heat and the remainder to stem rust. The loss in barley due to heat and rust can be roughly divided as 40 percent from stem rust and 60 percent from heat. Winter wheat losses, on the other hand, can be assessed on a 50 - 50 basis between stem rust and heat. Losses in spring wheat, however, can be divided on the basis of a 60 percent damage due to stem rust ravages and 40 percent due to heat. These estimates are based on a compilation of the data from all three sources, and do not take into consideration the many fields of grain, which owing to various conditions were not harvested, nor the damage resulting from leaf rusts. It is quite apparent, therefore, that stem rust took its toll of spring and winter wheats and barley but that the hot, dry winds were responsible primarily for the poor filling of the heads and shriveled berries, which resulted in extremely low test weights, while the loss actually occurring in rye and oats was due for the most part to heat alone.

The Epilogue

In spite of an unusually erratic season, the sequence of factors necessary for a stem rust epidemic was fulfilled in Nebraska in 1935. These factors are, delayed seeding (spring wheat) or delayed early spring development (winter wheat), late heading and ripening, and a long fruiting period with favorable weather for an extensive infection by a large amount of initial inoculum about the time of heading of the winter grains.

It is interesting to speculate on what the losses from stem rust might have been if the weather in July had remained favorable for further rust development. It may be surmised, however, that the sudden coming of hot weather in early July perhaps reduced the final yield of all grains in the eastern half of the State more than if stem rust had continued its ravages. At any rate, so far as Nebraska is concerned, the losses directly due to heat will approximate those due to stem rust, if all the grain crops are considered.

Whenever the sequence and combination of factors click, as they did in 1935, stem rust epidemics will occur in the future as they have prevailed in the past. Fortunately the many factors involved synchronize only in occasional years. The fact that stem rust epidemics may occur in the future should in no way deter the continued eradication of the barberry in the Great Plains area west of the Mississippi River, nor the intensive breeding of rust-resistant varieties of small grains. Through breeding rust-resistant varieties for those areas in Texas where urediospores normally overwinter, the prevention, or at least the mitigation of this annual source of stem rust can be made effective. Only when the two sources of rust are reduced or prevented will stem-rust epidemics disappear in the extensive wheat-growing area of the Great Plains region.

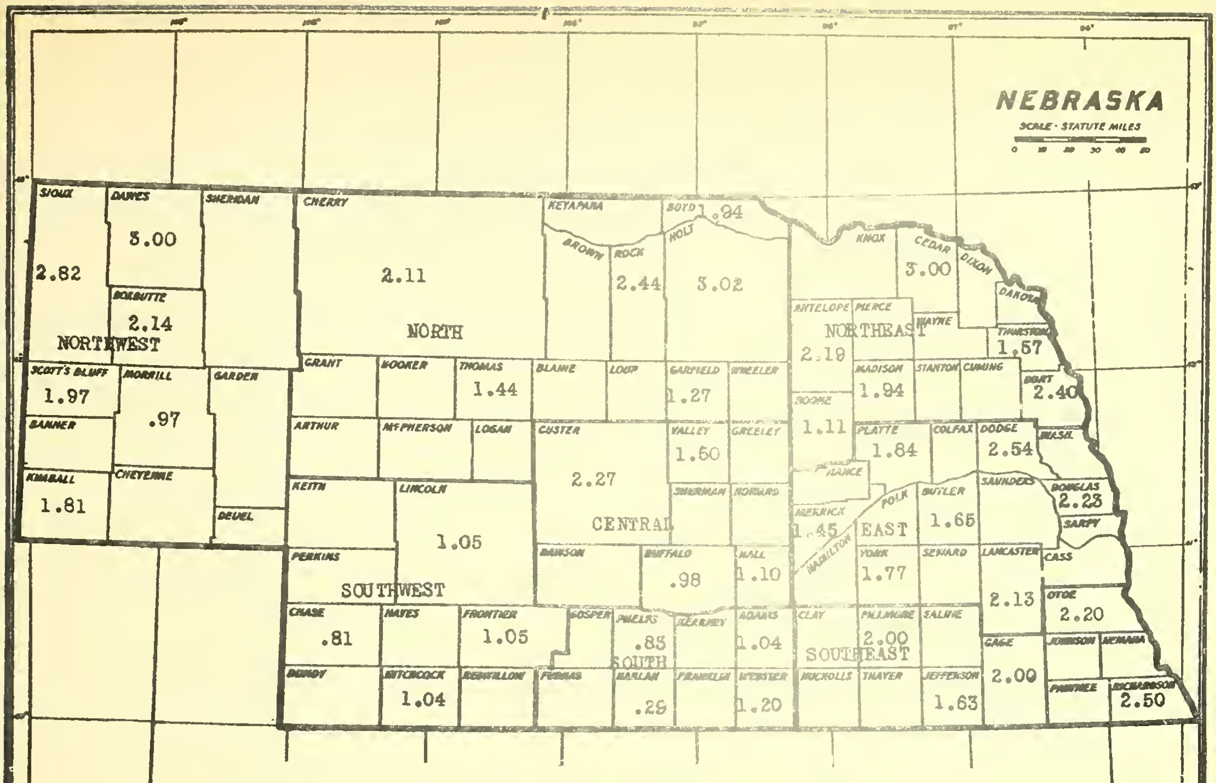

Fig. 1. Total precipitation from January 1 to March 31, 1935, at 42 points in Nebraska.

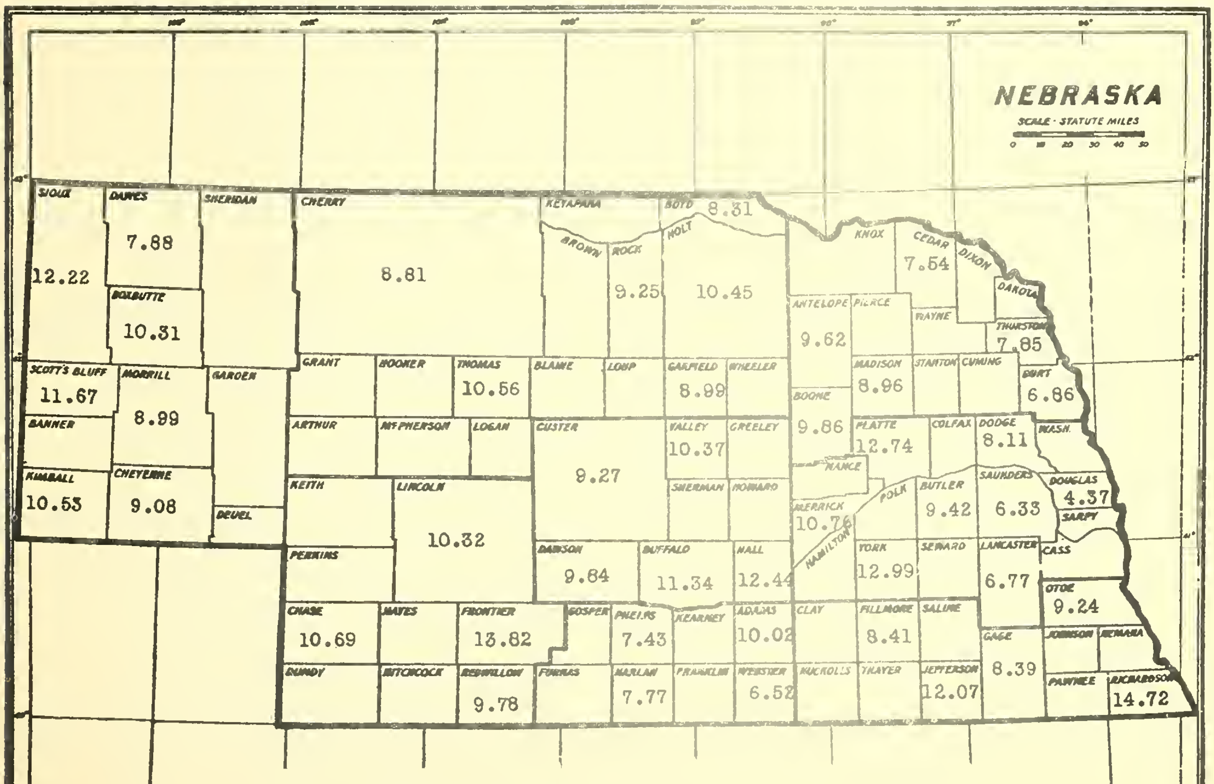

Fig. 2. Total precipitation from April 1 to May 31, 1935, at a number of points in Nebraska.

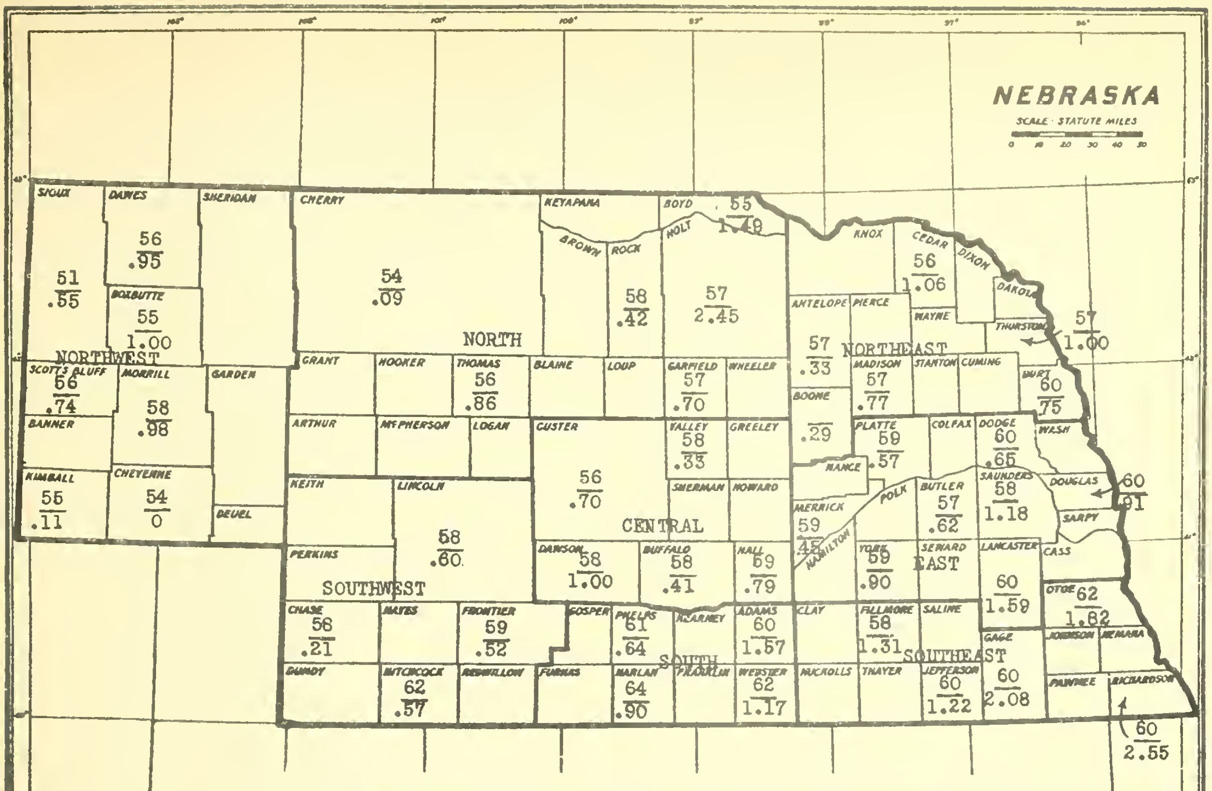

Fig. 3. Mean temperatures (above) and total precipitation (below) for the week of June 1 to 7, 1935.

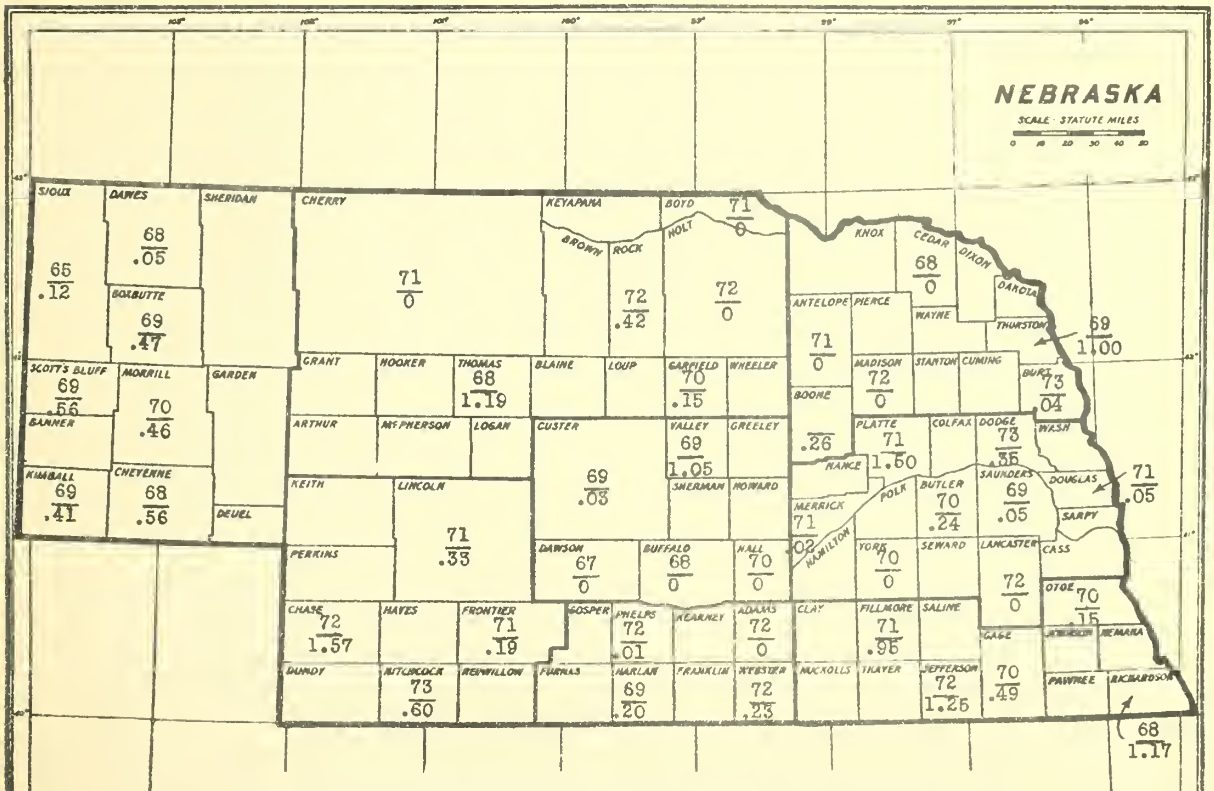

Fig. 4. Mean temperatures (above) and total precipitation (below) for the week of June 8 to 14, 1935.

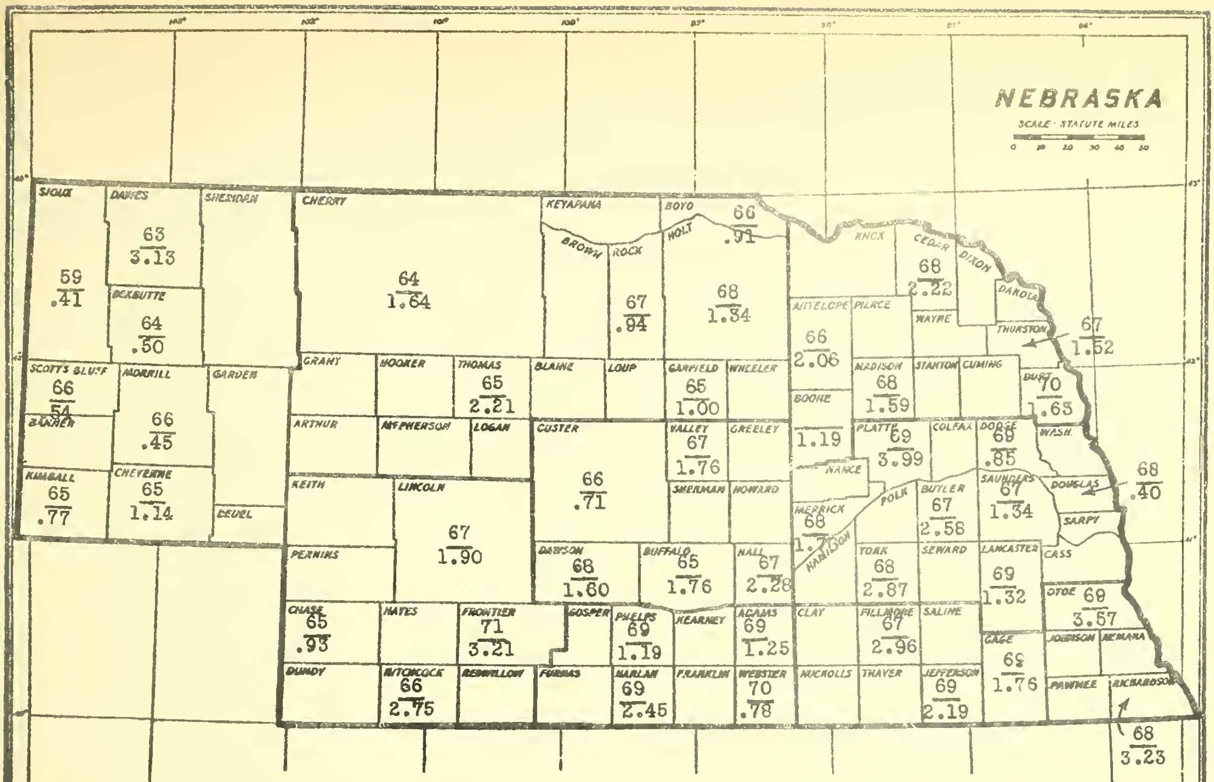

Fig. 5. Mean temperatures (above) and total precipitation (below) for the week of June 15 to 21, 1935.

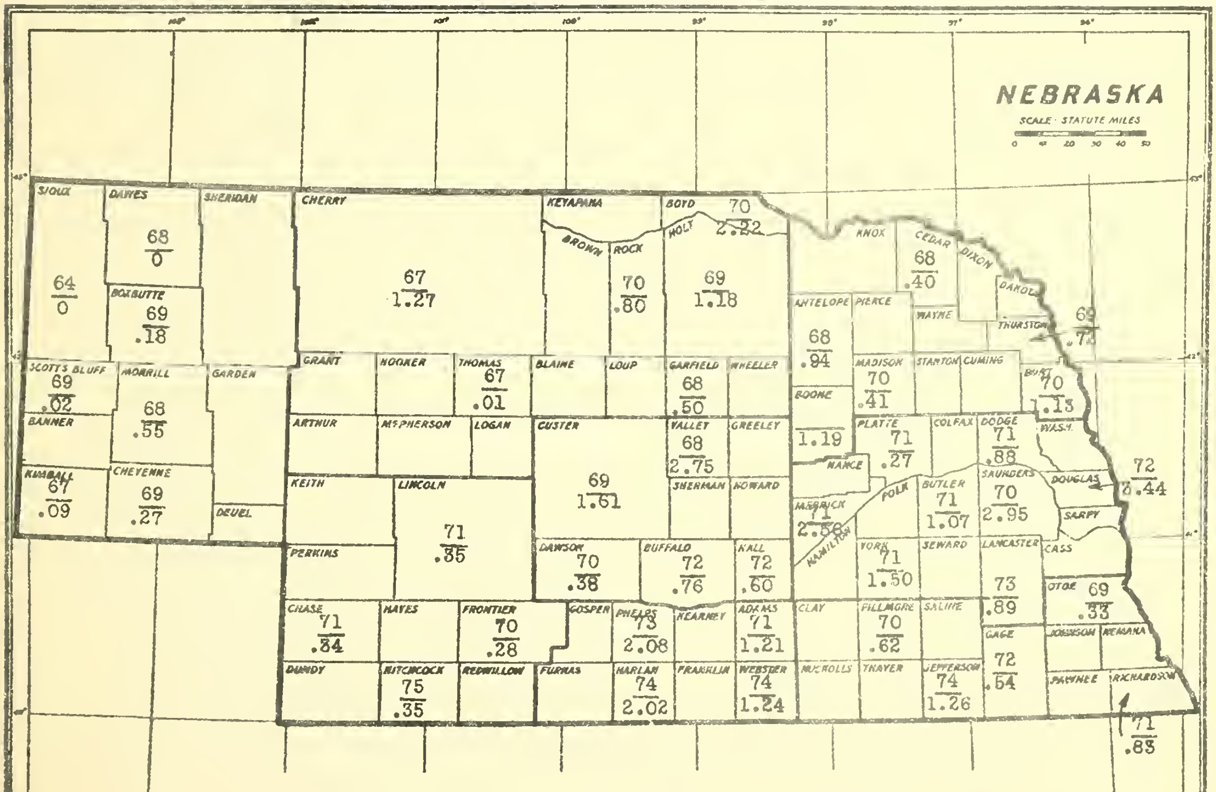

Fig. 6. Mean temperatures (above) and total precipitation (below) for the week of June 22 to 28, 1935

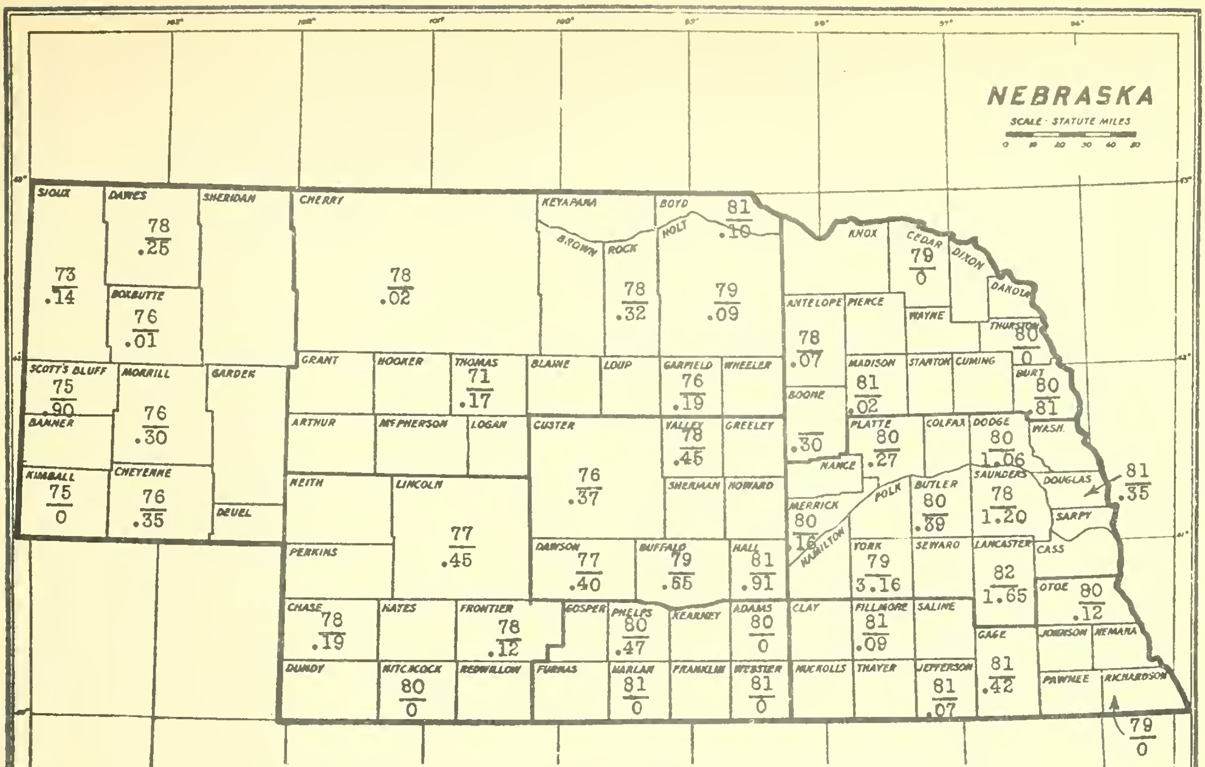

Fig. 7. Mean temperatures (above) and total precipitation (below) for the week of June 29 to July 5, 1935

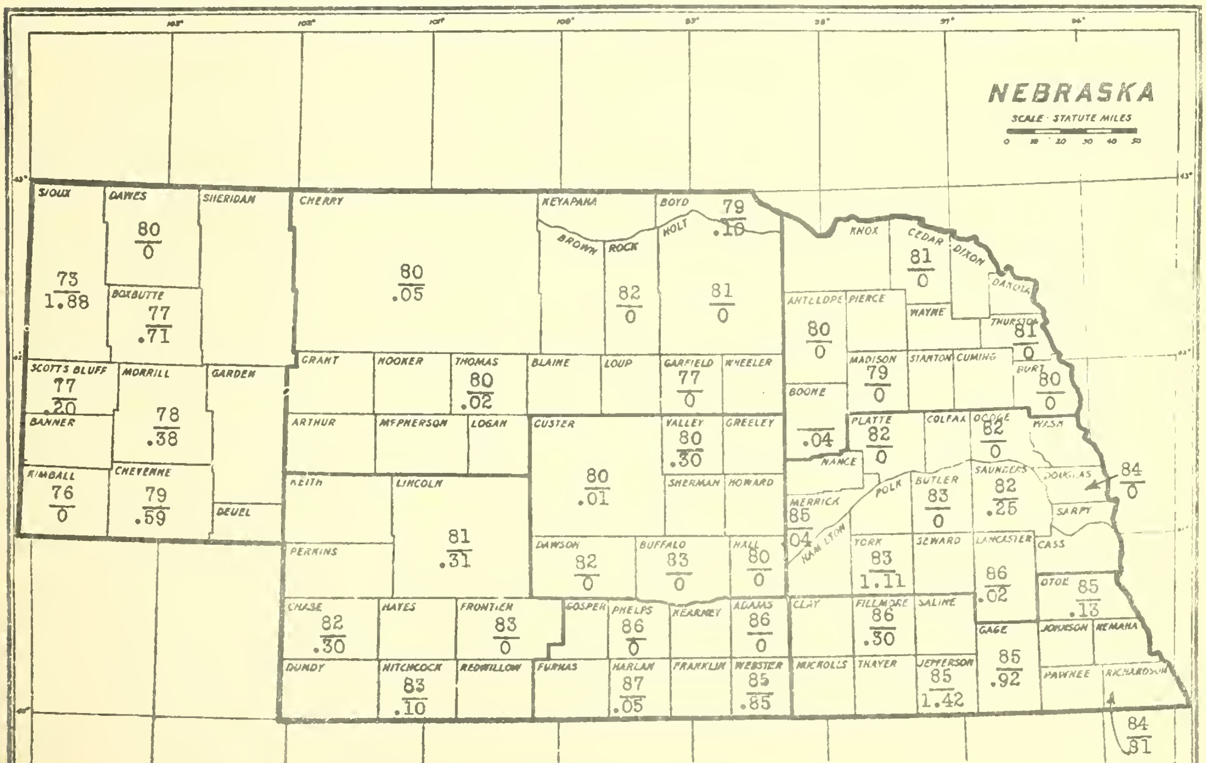

Fig. 8. Mean temperatures (above) and total precipitation (below) for the week of July 6 to 12, 1935.

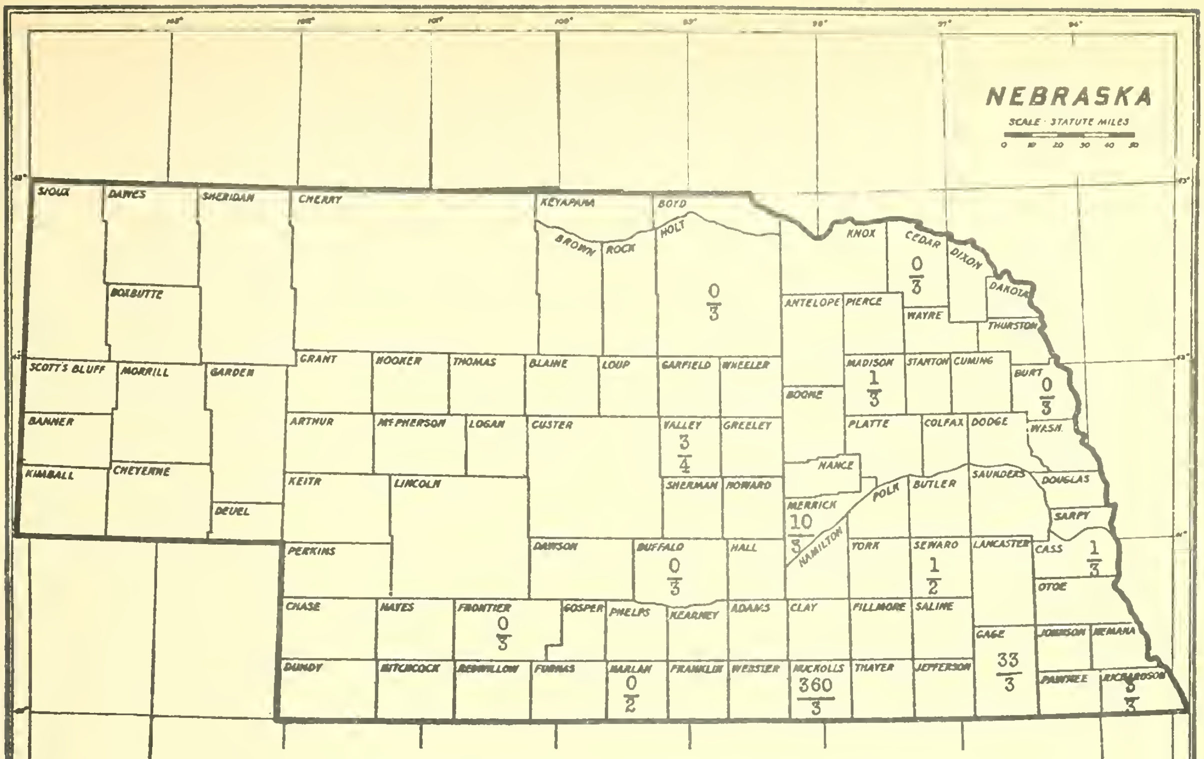

Fig. 9. The total number of stem rust urediospores (above) caught by 24-hour slide exposures (below) during the week of May 15 to 21, 1935.

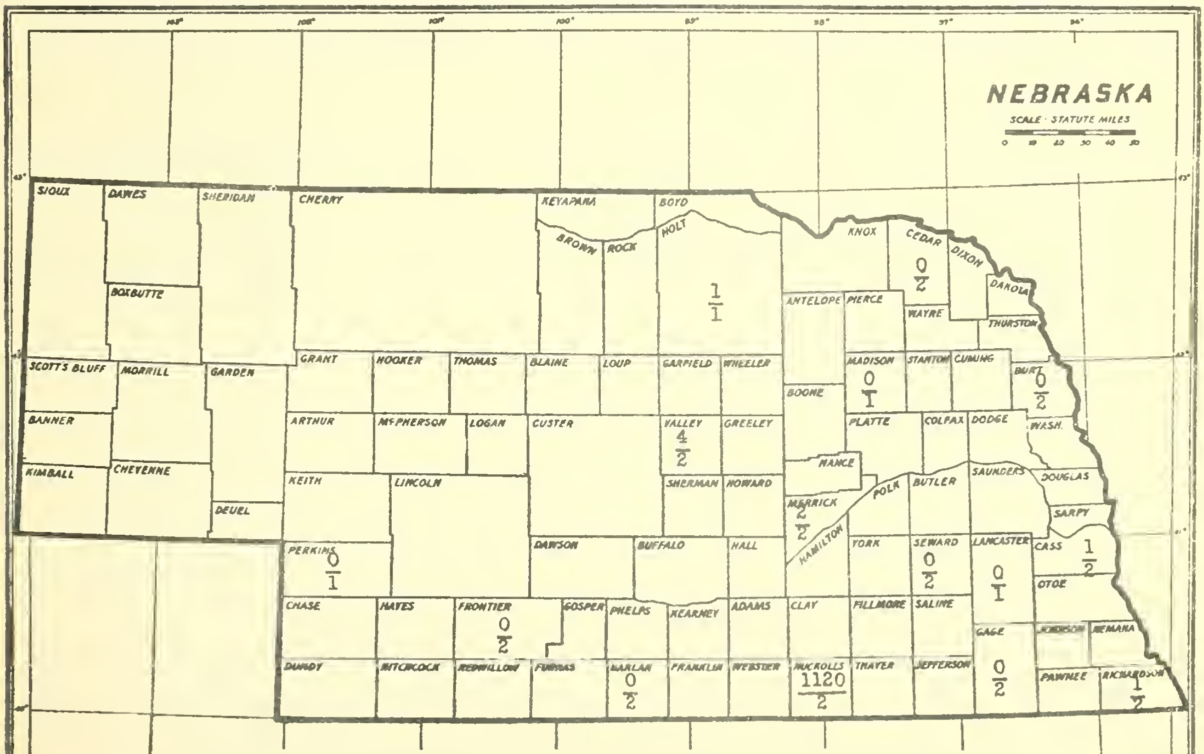

Fig. 10. The total number of stem rust urediospores (above) caught by 24-hour slide exposures (below) during the week of May 22 to 28, 1935.

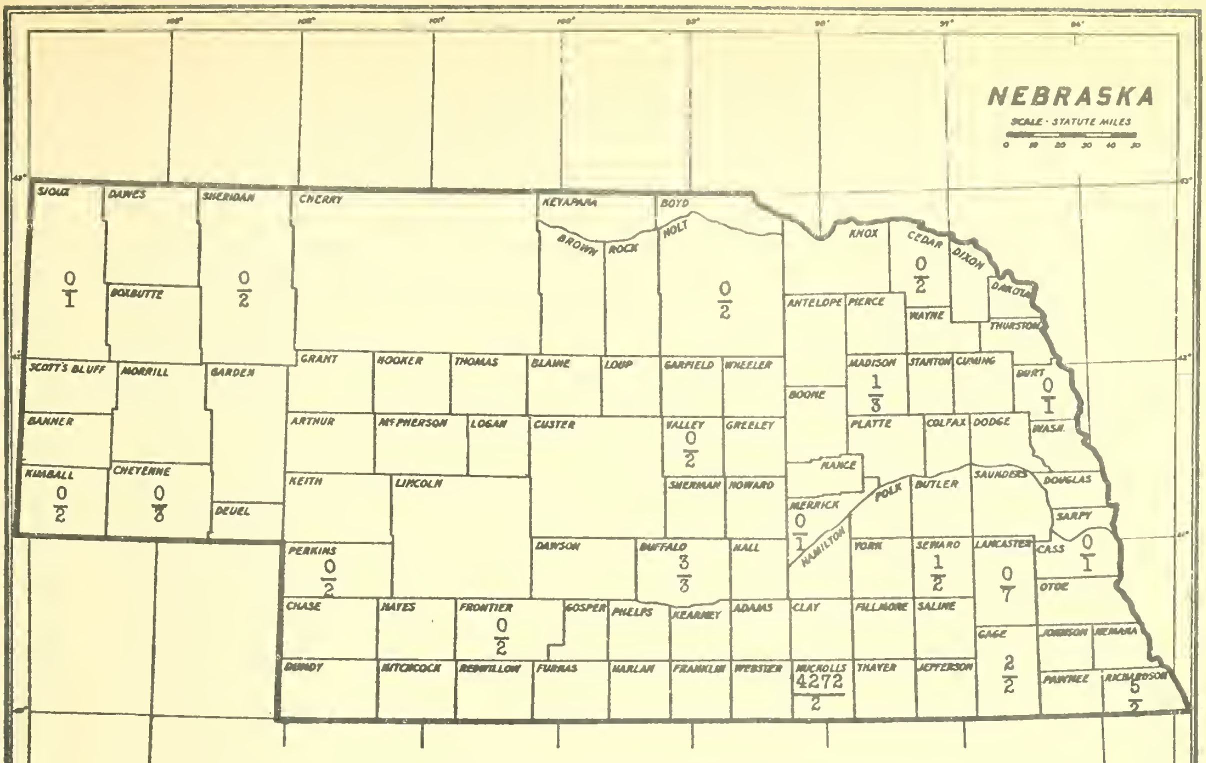

Fig. 11. The total number of stem rust urediospores (above) caught by 24-hour slide exposures (below) during the week of May 29 to June 4, 1935.

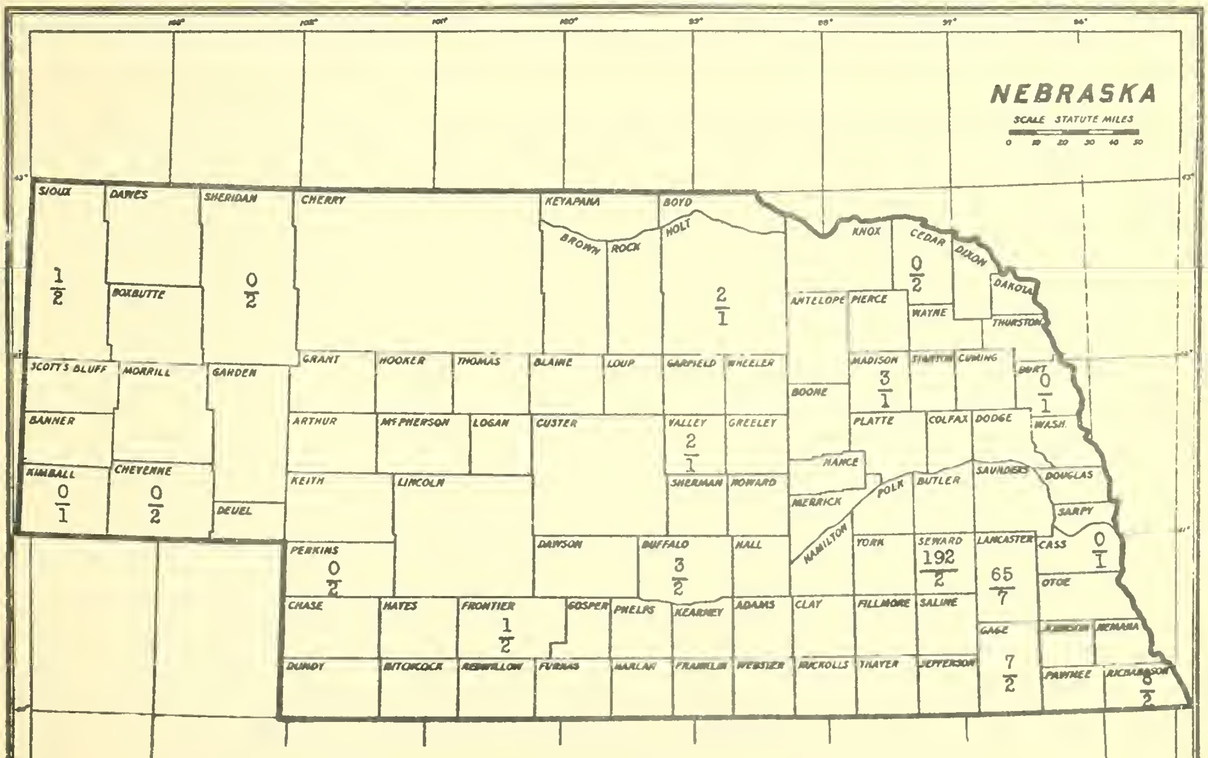

Fig. 12. The total number of stem rust urediospores (above) caught by 24-hour slide exposures (below) during the week of June 5 to 11, 1935.

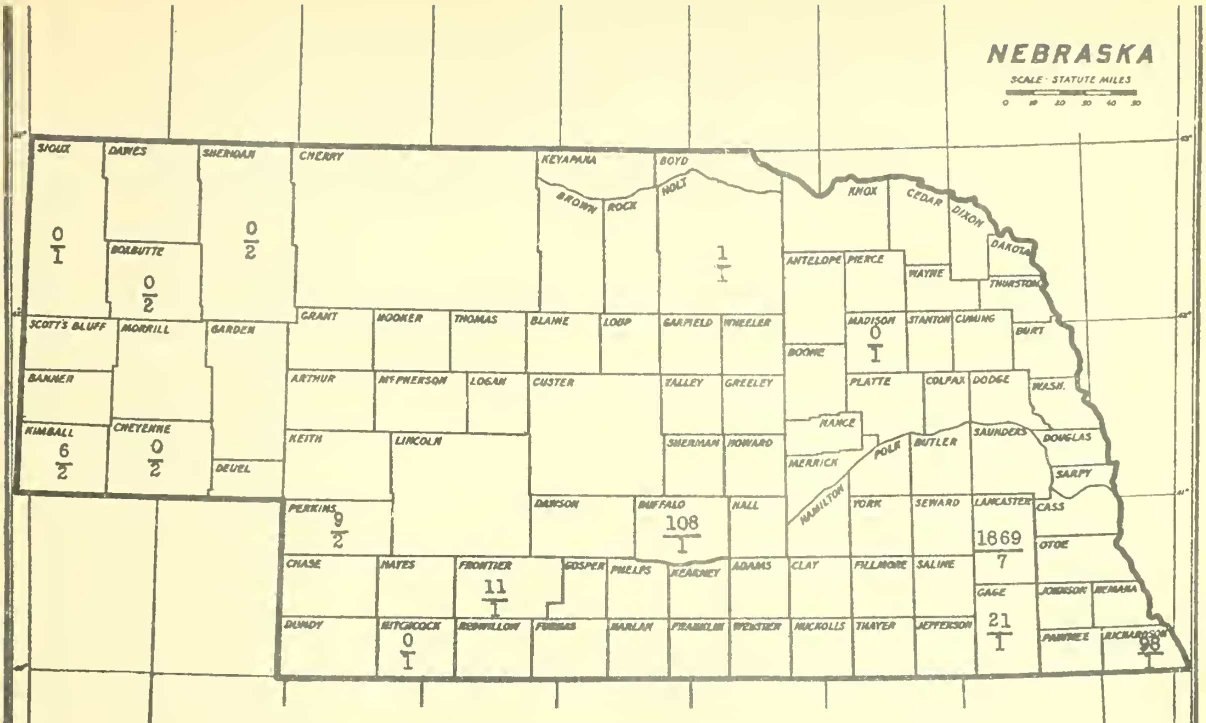

Fig. 13. The total number of stem rust urediospores (above) caught by 24-hour slide exposures (below) during the week of June 12 to 18, 1935.

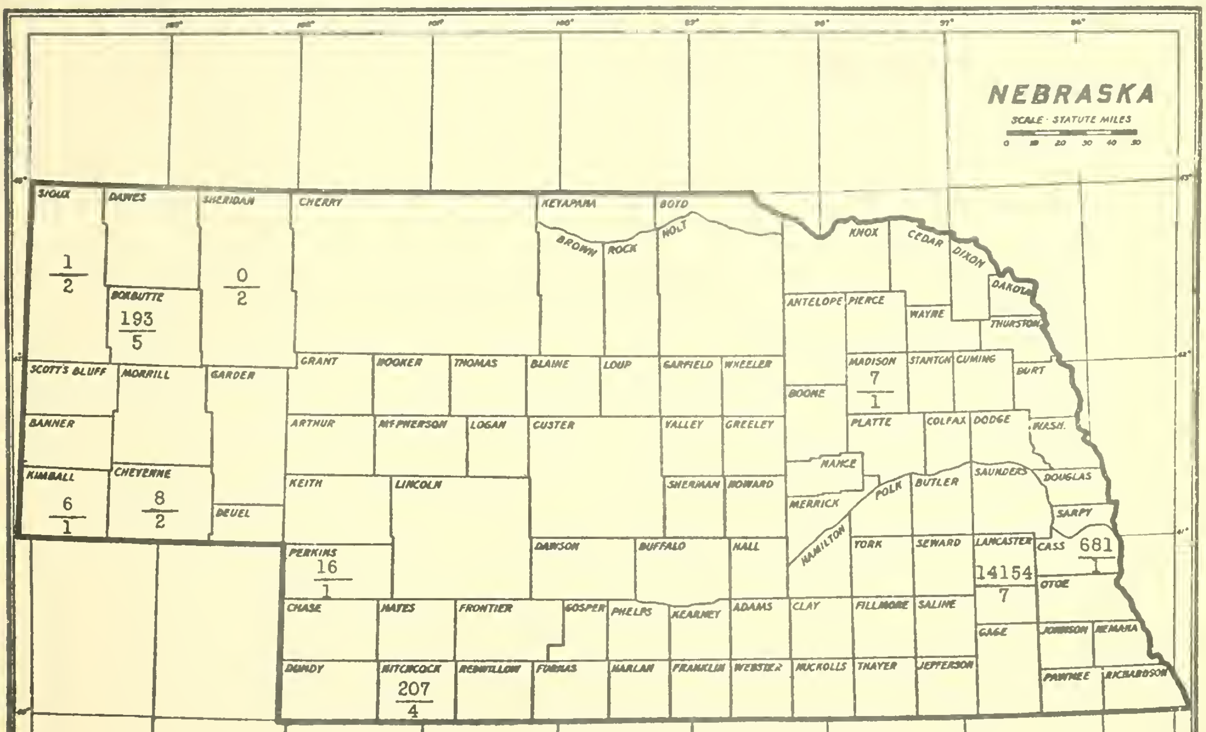

Fig. 14. The total number of stem rust urediospores (above) caught by 24-hour slide exposures (below) during the week of June 19 to 25, 1935.

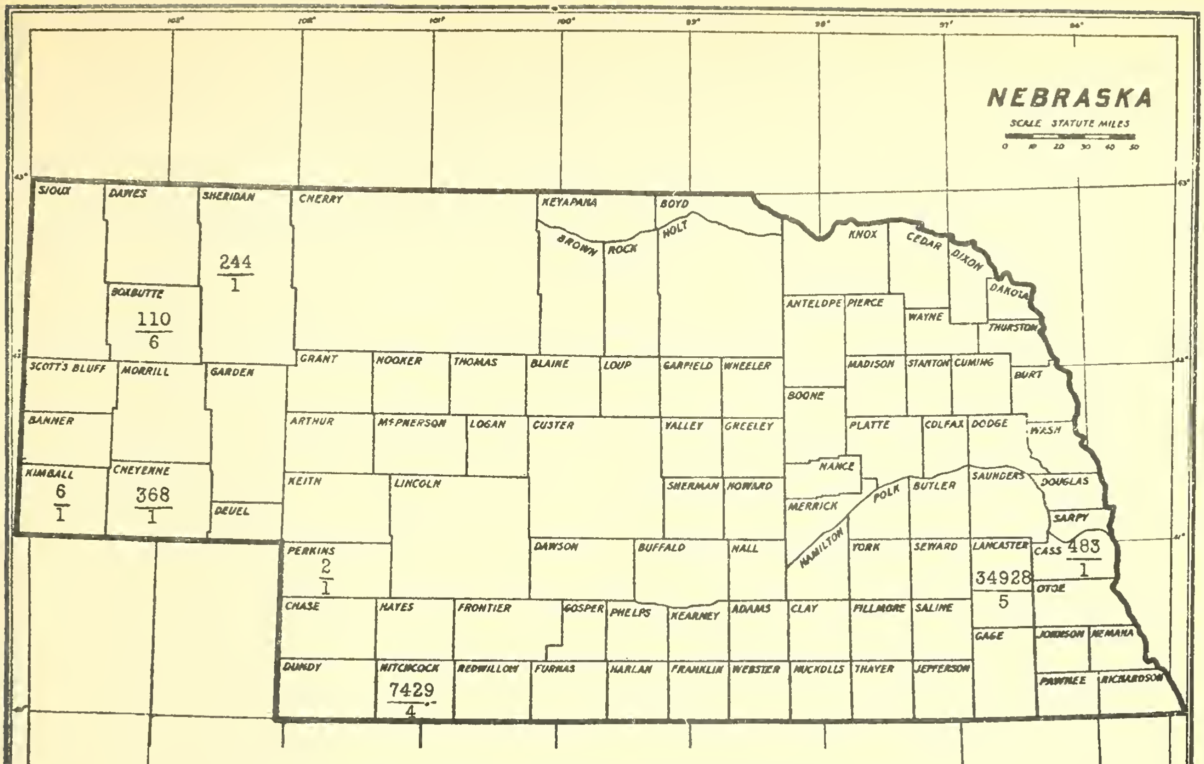

Fig. 15. The total number of stem rust urediospores (above) caught by 24-hour slide exposures (below) during the week of June 26 to July 1, 1935.

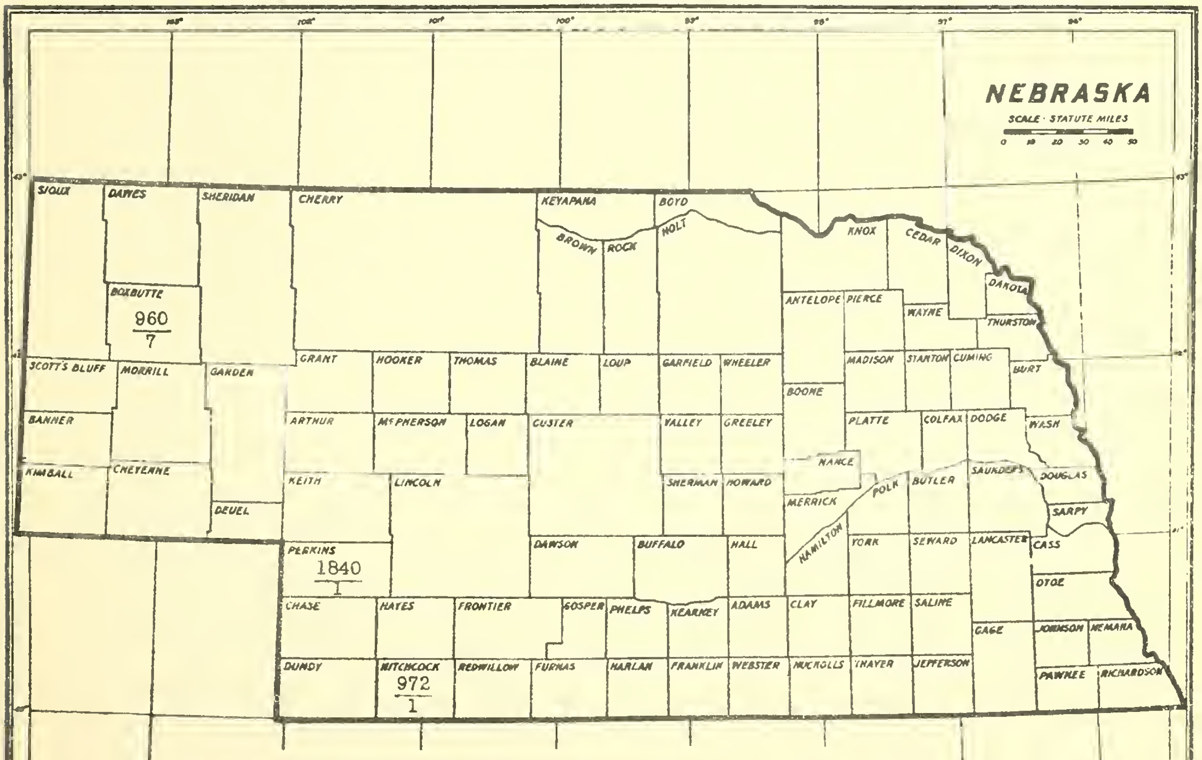

Fig. 16. The total number of stem rust urediospores (above) caught by 24-hour slide exposures (below) during the week of July 2 to July 8, 1935.

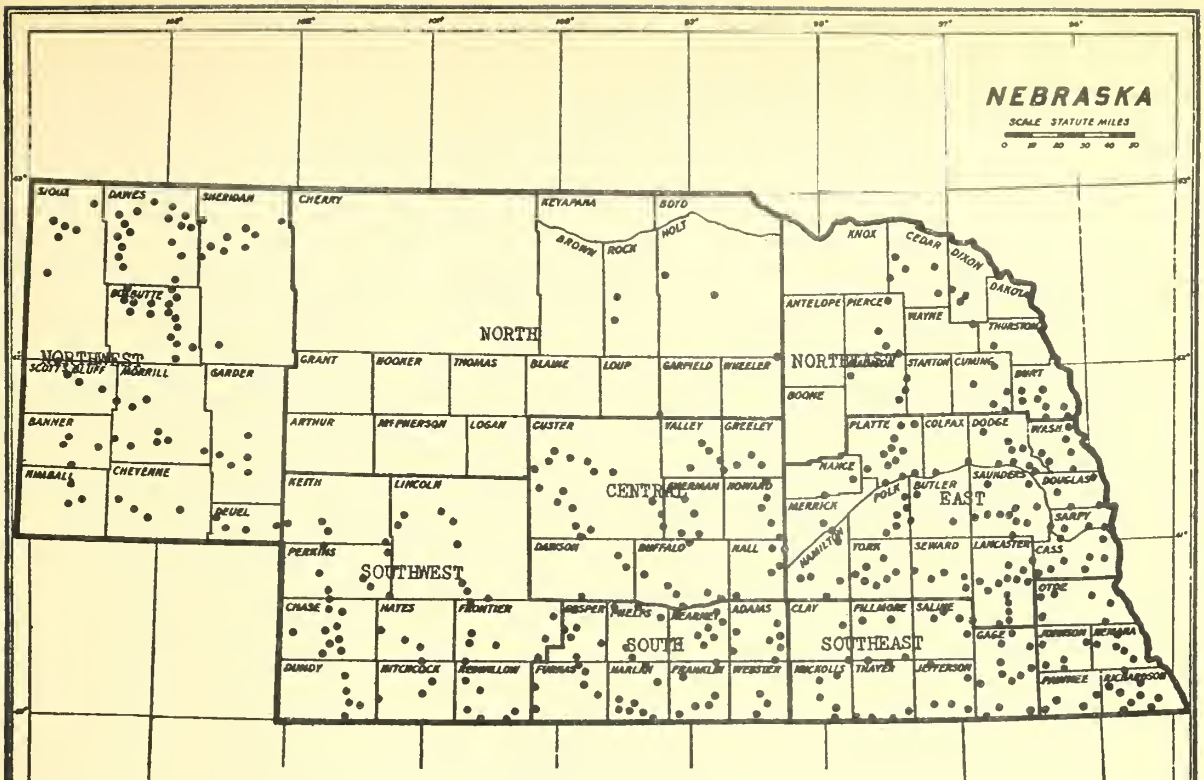

Fig. 17. Localities from which more than 600 stem rust collections were obtained in 1935.

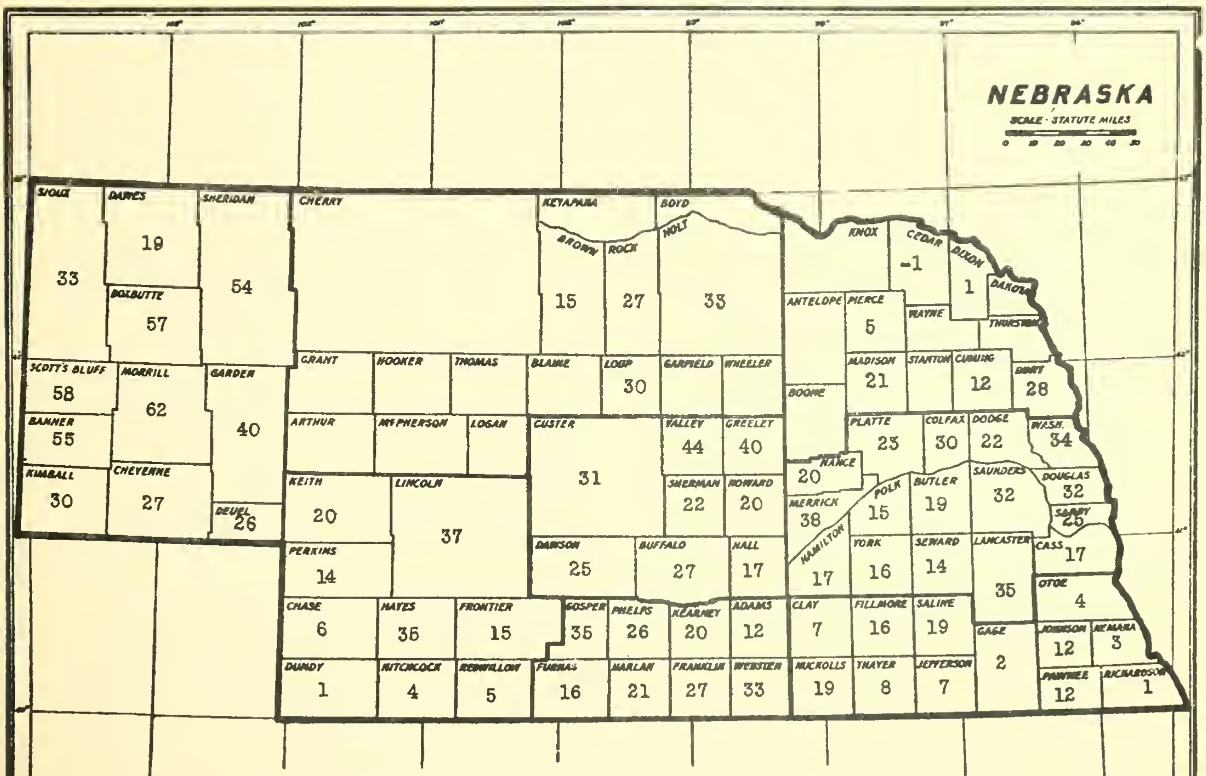

Fig. 18. The relative severity in percent of wheat stem rust by counties in 1935.

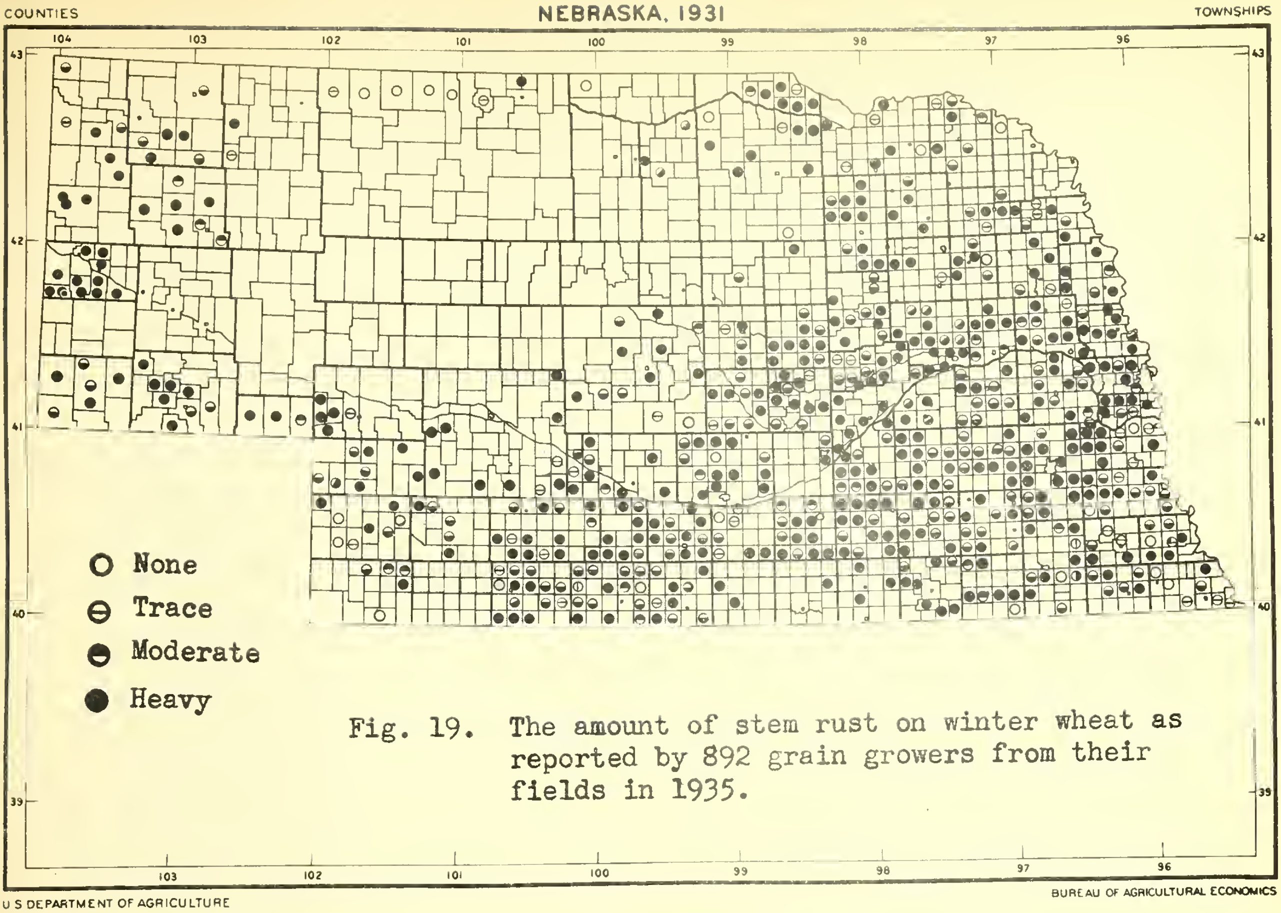

Fig. 19. The amount of stem rust on winter wheat as reported by 892 grain growers from their fields in 1935.

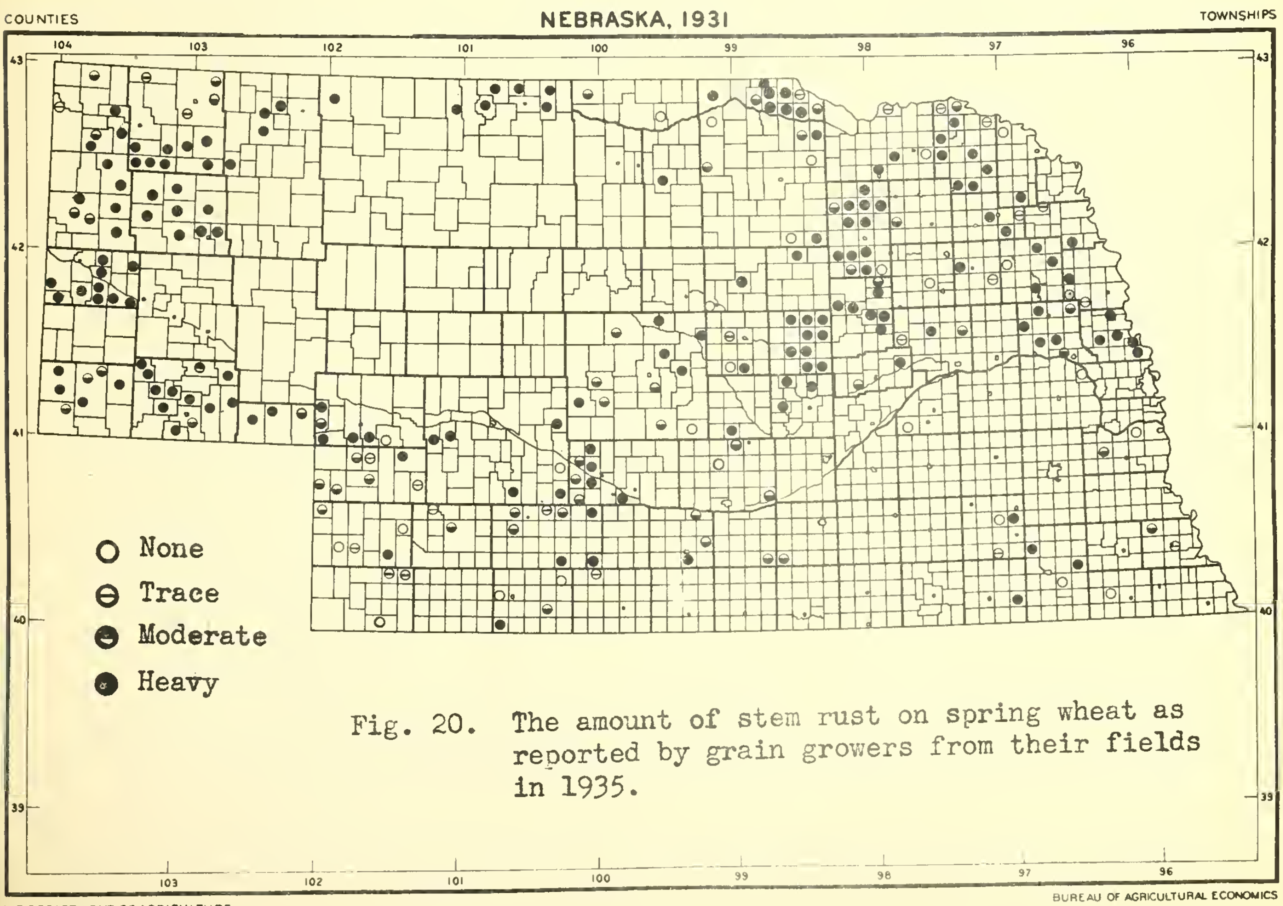

Fig. 20. The amount of stem rust on spring wheat as reported by grain growers from their fields in 1935.

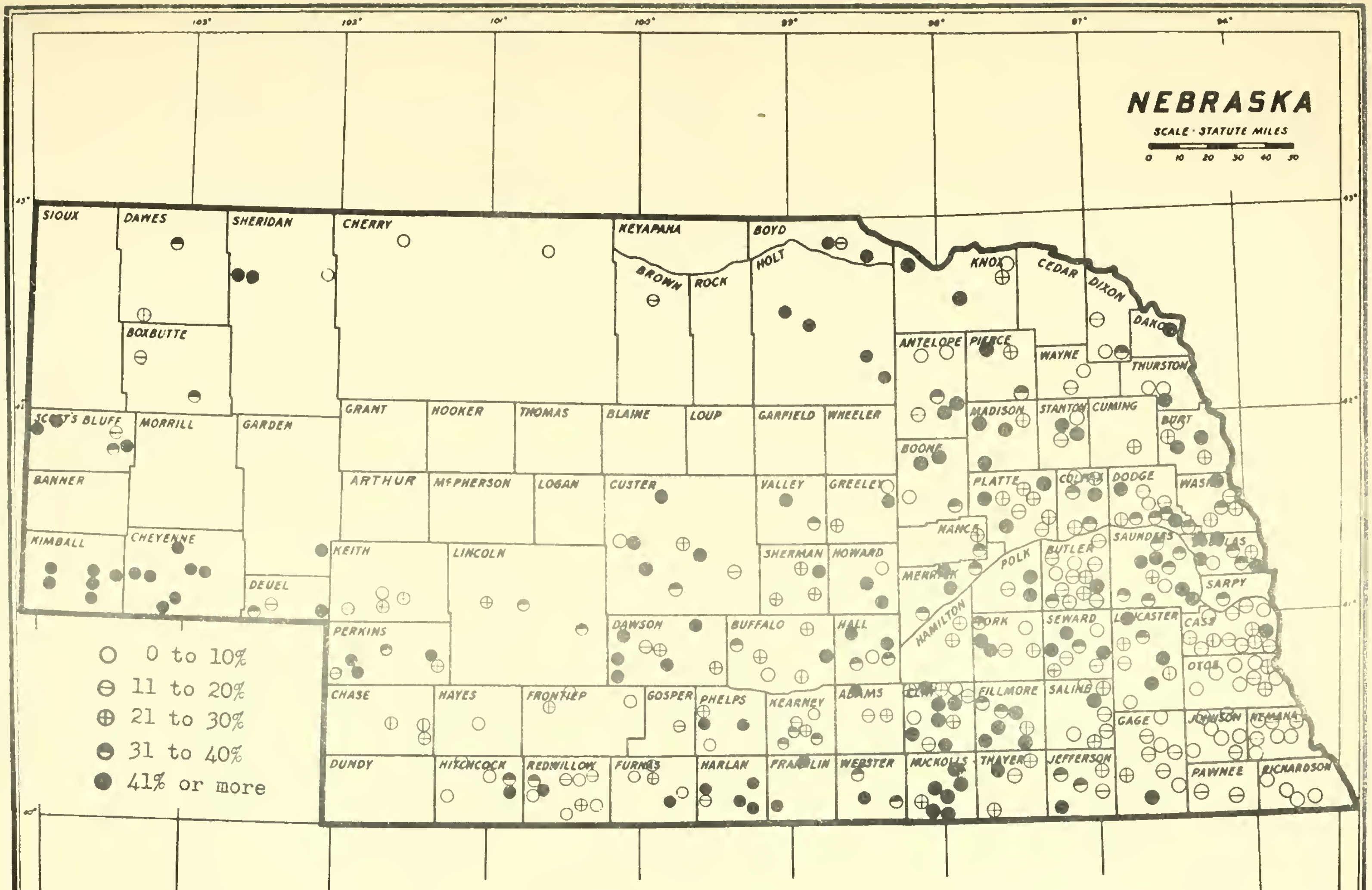

Fig. 21. The estimated wheat stem rust losses as reported by the grain dealers in 1935.

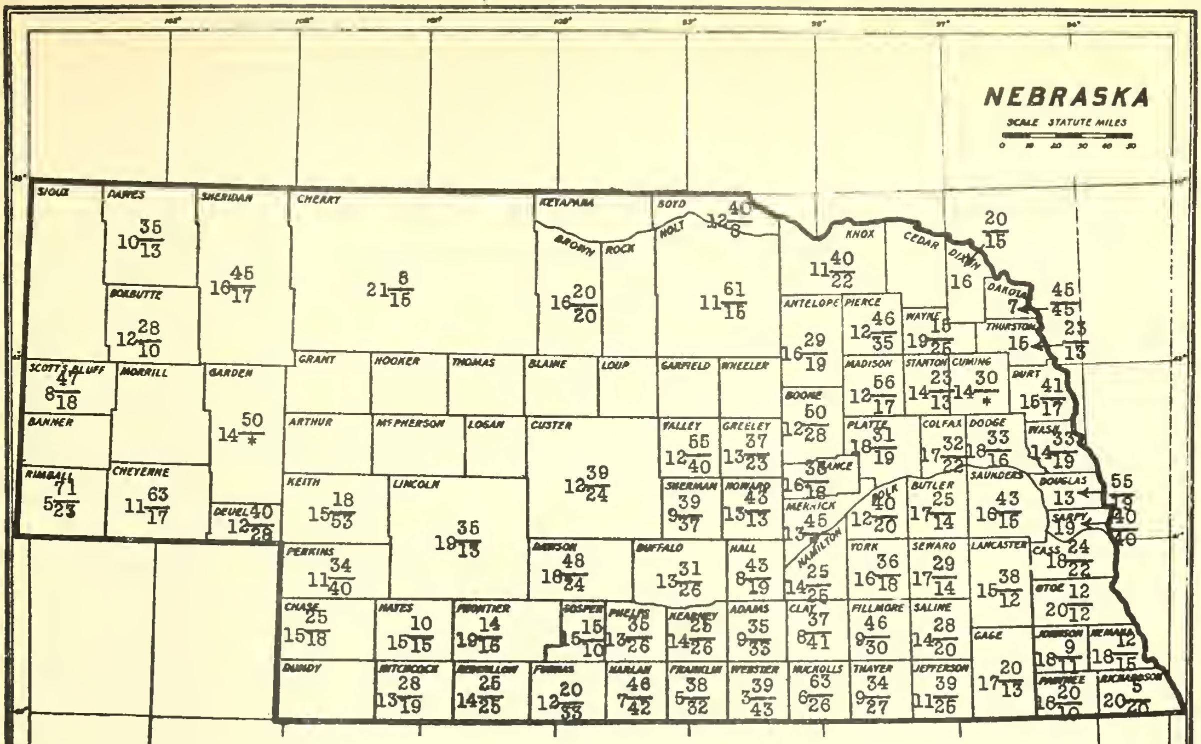

Fig. 22. The yield per acre in bushels, the percentage of loss attributed to stem rust (above), and the percentage of loss through heat (below), as estimated by the grain dealers for winter wheat in 1935.

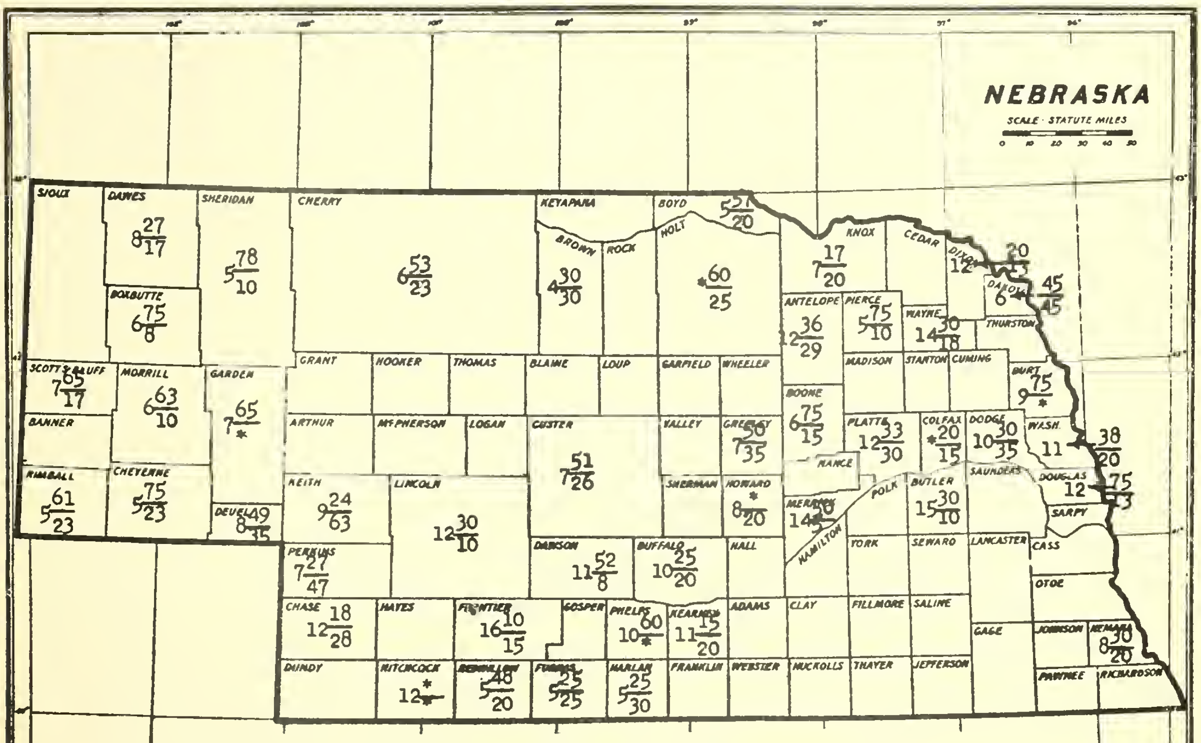

Fig. 23. The yield per acre in bushels, the percentage of loss attributed to stem rust (above), and the percentage of loss through heat (below), as estimated by the grain dealers for spring wheat in 1935.

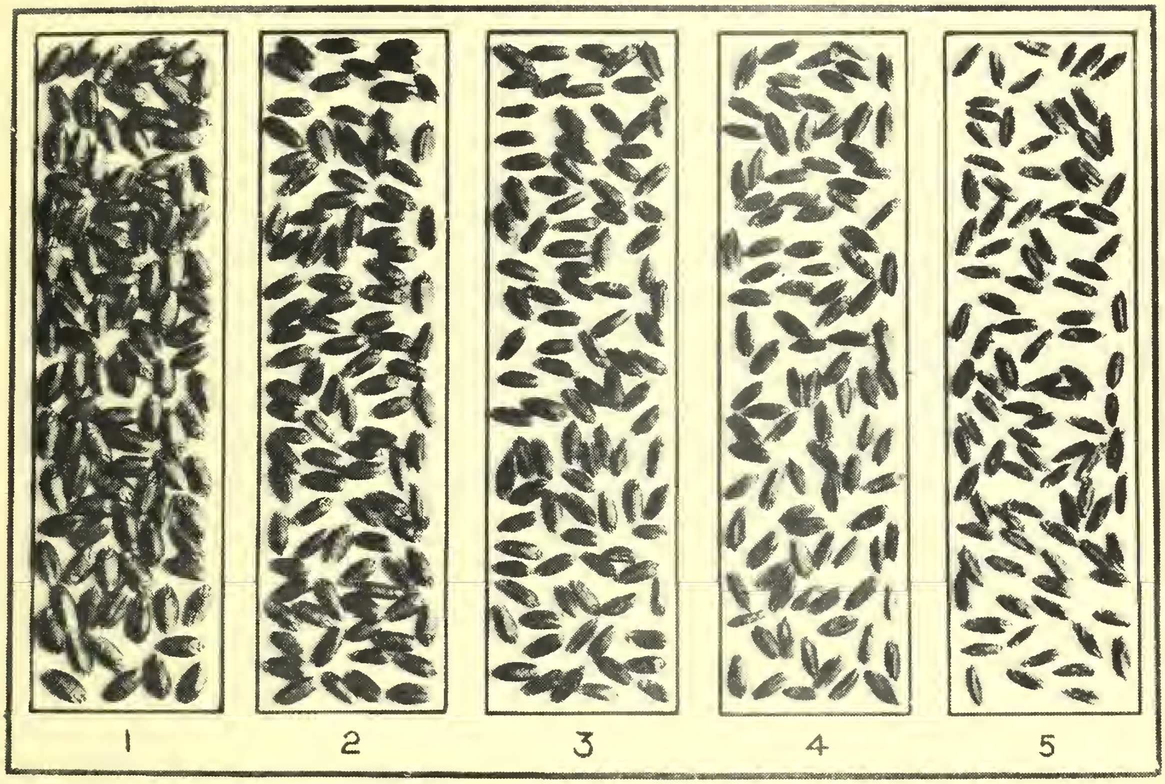

Plate I. Scale used in estimating the degree of shriveling in the wheat samoles collected in Nebraska during 1935. The photograph shows five arbitrary degrees of shriveling from plump to badly shriveled berries. There are 100 kernels in each grade.

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Supplement 92

The Stem Rust Epidemic of 1935 in Kansas

July 15, 1936

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

THE STEM RUST EPIDEMIC OF 1935 IN KANSAS 1/

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Supplement 92 July 15, 1936.

The stem rust (Puccinia graminis tritici) epidemic of 1935, following a year of extreme drought, dealt a severe blow to the hard red winter-wheat crop of Kansas. Heavy losses from stem rust are uncommon in Kansas, and the outbreak of 1935 was accompanied by so many unusual circumstances, that it seems advisable to record certain observations on its development. Seldom in the history of wheat production in this State has stem rust been so widely distributed and so severe in its attack. A severe epidemic occurred in 1904 and a rather severe one was reported in 1916, although the latter probably was less severe in Kansas than in the northern spring-wheat States. Heavy infections occurred in a few localities of the State in 1919 and severe losses occurred in northwestern counties in 1923. From that time until 1935, stem rust on winter wheat occurred principally in scattered localities and the disease was relatively unimportant from the standpoint of the Kansas wheat crop. The epidemic of 1935, however, was beyond question the most severe since that of 1904 and the recurrence of rust in such severity after a period of 31 years is a matter of considerable interest.

Meteorologic Conditions and their Relation to the Epidemic

Seldom in the history of Kansas has there been such a series of unusual weather conditions as those prevalent in 1934 and 1935. The summer of 1934 was one of almost unprecedented heat and drought in all parts of the State. Nearly everywhere the water table receded considerably and in the western two-thirds of the State subsoil moisture practically disappeared.

1/ Contribution No. 361 from the Department of Botany, and No. 260 from the Department of Agronomy, Kansas Agricultural Experiment Station, in cooperation with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture.

Sufficient rain fell during September and October 1934 to moisten the top soil and give winter wheat a satisfactory start in the eastern two-thirds of the State. The subsoil, however, remained very dry, especially in the central third. In the western third the drought continued unbroken; despite light rains, and much winter wheat either failed to emerge or was seriously handicapped by drought throughout its life.

The winter of 1934-35 was extremely mild and dry throughout Kansas, but drought was most severe in the western third of the State. In the central third the winter and early spring drought was unusually severe for that section and winter wheat was seriously injured.

In all parts of the State the drought continued unbroken through March and April and the first week of May 1935. During this period temperatures were normal to slightly above normal.

Beginning on May 9, rains fell at frequent intervals during the remainder of May and June over the eastern and central thirds of the State. Figure 1 shows the frequency and amount of precipitation, as well as maximum and minimum temperatures, at Manhattan for May and June. The rainfall distribution was fairly representative of conditions in the eastern two-thirds of the State.

The principal factors limiting the distribution, development, and spread of stem rust in Kansas are rainfall and recurrent dew, although temperatures favorable for germination of rust spores and infection are important, as will be shown later. There is abundant evidence in Kansas to show that initial and wide-spread infections of stem rust have started in southern Kansas in many years, but the lack of rainfall in May and early June, accompanied by dry, warm winds and the rapid maturity of the wheat crop, afforded an escape from serious injury. The proper combination of moisture and temperature, therefore, are essential to the development of epidemics such as that of 1935.

Rainfall was considerably below normal in all parts of the State during April and much above normal in all sections in May, as shown in Table 1. Rainfall during June was above normal in the eastern and central sections, although slightly below normal in the western third. In July there was subnormal rainfall in all parts of the State, ranging from a deficiency of 2.05 inches in the western third, to 3.30 inches in the eastern third of the State.

The data in Table 1 show that moisture conditions favorable for the development of stem rust occurred in the eastern two-thirds of Kansas during May and June. Not only was the total rainfall sufficient but the large number of days with rains of .01 inch or more indicates a generally

Table 1. Rainfall and cloudiness recorded in different sections of Kansas during April, May, June, and July 1935. a/

Month	Section of State	Total precipitation in inches	Departure from normal in inches	Number of rainy days b/	Number of days with clouds c/	Number of clear days
April	Eastern	2.13	-1.14	8	21	9
	Central	1.02	-1.45	5	19	11
	Western	0.25	-1.78	2	18	12
	State d/	1.13	-1.46	5	19	11
May	Eastern	10.22	+5.37	17	27	4
	Central	8.46	+4.64	15	26	5
	Western	4.65	+2.00	13	18	13
	State	7.78	+4.01	15	26	5
June	Eastern	7.30	+2.40	15	20	10
	Central	5.05	+0.91	12	18	12
	Western	2.90	-0.05	8	12	18
	State	6.79	+2.17	17	15	15
July	Eastern	0.47	-3.30	2	7	24
	Central	0.76	-2.34	2	6	25
	Western	0.80	-2.05	3	5	26
	State	0.68	-2.56	2	6	25

a/ Data from records of U. S. Weather Bureau.
b/ Number of days with precipitation of .01 inch or more.
c/ Includes both cloudy and partly cloudy days.
d/ Average for the entire State.

humid condition during most of those two months. The large number of cloudy or partly cloudy days during that period serves further to emphasize the favorable humidity conditions which prevailed. The distribution of rains at Manhattan shown in Figure 1 also indicates that moisture conditions were very favorable for stem-rust infection. Although no records of relative humidities are included here, the data in Figure 1 and Table 1 suggest that humidities were high and dews were frequent. No dews were recorded at Manhattan until May 10, after which date they occurred nearly every night until the end of June.

Temperatures, while not so favorable as moisture conditions during May and June, were satisfactory for heavy stem-rust infection. The optimum temperature for infection and development of stem rust of wheat is usually considered to lie between 66° and 77° F., but it is well known that some infection occurs and the disease may develop fairly well at temperatures somwehat above and below those limits.

Table 2. Temperatures recorded in different sections of Kansas during April, May, June, and July 1935.

Month	Section of State	Temperature in degrees Fahrenheit: Absolute maximum	Absolute minimum	Mean	Departure from normal
April	Eastern	87	25	52.8	-3.0
	Central	90	22	52.6	-2.7
	Western	89	20	51.4	-1.4
	State	90	20	52.3	-2.4
May	Eastern	90	34	60.4	-4.1
	Central	97	27	60.0	-4.1
	Western	98	28	56.7	-5.4
	State	98	27	59.0	-4.7
June	Eastern	94	39	70.6	-3.6
	Central	99	39	71.1	-3.2
	Western	104	38	71.2	-1.2
	State	104	38	71.0	-2.7
July	Eastern	108	57	84.8	+5.6
	Central	113	53	84.8	+5.1
	Western	112	54	83.6	+5.6
	State	113	53	84.3	+5.5

Mean temperatures were below normal throughout the State during April, May and June and considerably above normal in July, as shown in Table 2. It is believed that mean temperatures are less important in the infection and development of stem rust than minimum temperatures, since the latter occur at night. It is well known that most rust spores germinate in dew or other films of water at night or in the very early morning. Figure 1 shows that the minimum temperature did not exceed 60° F. until May 19. On that date and the two following days, the

temperature favored spore germination. Rain fell on each of those three days, also. This was the first time in the season when simultaneous incidence of favorable temperature and moisture conditions occurred. A second such period occurred during the 9 days of May 26 to June 3, inclusive. A third very favorable infection period occurred from June 11 to 17, inclusive, and a fourth from June 25 to 30, inclusive. Thus it seems that there were four periods during May and June, ranging from 3 to 9 days in length and separated by intervals of about a week, in which temperature and moisture conditions were highly favorable for heavy infection and rapid development of stem rust. In addition it is probable that considerable infection was occurring continuously from May 19 to June 30. The first primary stem-rust infections were found at Manhattan on June 5. Assuming that ten days were required for the fungus to reach fruition, that would place the date of infection at about May 26, the beginning of the second favorable period mentioned above.

Crop Conditions Favoring the Development of Stem Rust

Besides favorable weather conditions for stem-rust infection in 1935 there were certain unusual crop conditions that also greatly favored the epidemic. Due to the prolonged early spring drought, winter wheat was about a week late in heading in many parts of the State, especially in the western two-thirds. At Manhattan, which lies near the western boundary of the eastern third, most varieties headed at about the normal time, as shown in Table 3. There was a large area in central Kansas (Fig. 2) where wheat was seriously injured by the drought of the winter and early spring. In that area stands were short and thin and tillering was very limited. About the middle of May many plants in such fields put out an average of about one small head each. After the rains of the last three weeks in May and the first week in June, these plants produced many new tillers, and finally about the last of June a second crop of heads was produced. Thus on July 1 there were many fields in central Kansas in which the plants bore one or two tillers on which the grain was nearly mature and several other tillers which were still green. These tillers which headed very late were in a succulent, extremely susceptible stage when the heavy stem-rust infection developed late in June and, consequently, aided the development of the stem-rust epidemic.

One of the reasons why stem rust seldom injures the hard red winter wheats is that they usually are too far advanced before conditions become favorable for heavy stem-rust infection. It frequently happens that rather heavy local infections of stem rust develop a few days before harvest, but such infections come too late to seriously injure the crop and the plants mature so quickly that there is no opportunity for the piling up of inoculum through the production of several urediospore generations.

Perhaps more important than delayed heading was the prolonged fruiting period of the 1935 crop. The average length of the fruiting period for 7 standard varieties of wheat grown at Manhattan for the five-year period 1930-1934 inclusive was 31.8 days as shown in Table 3. In 1935, however, the same varieties required an average of 44.8 days to reach maturity. The four standard hard red winter varieties, Turkey, Kharkof, Kanred, and Blackhull each required 12 days longer to reach maturity in 1935 than the average of the preceding 5-year period. When the semihard Kawvale and the two soft wheat varieties are included, the average 1935 fruiting period is 13 days longer than the preceding 5-year average.

Table 3. Date of heading and ripening, and length of the fruiting period of 7 standard varieties of wheat grown at Manhattan, Kansas, in 1935 compared with averages for the period 1930-1934 inclusive.

Variety	Date of heading 1930-1934	Date of heading 1935	Date of ripening 1930-1934	Date of ripening 1935	Number days fruiting period 1930-1934	Number days fruiting period 1935
	May	May	June	July		
Turkey	19	19	20	2	32	44
Kharkof	20	20	20	2	31	43
Kanred	19	19	19	1	31	43
Blackhull	17	18	19	2	33	45
Kawvale	16	12	17	1	32	50
Fulcaster	17	16	18	1	32	46
Harvest Queen	19	19	20	1	32	43
Average	18+	17+	19	1+	31.8	44.8

The extension of the 1935 fruiting period may have been partially due to the effect of the spring drought, since drought-injured plants in some cases were stimulated by the heavy rains of May and June to make new vegetative growth which remained green and succulent after the normal time for maturity. It is probable, however, that the long fruiting period was due principally to the moderate temperature and ample moisture, which permitted the culms produced at the normal time to function for a longer time than usual.

The increase in the length of the fruiting period not only permitted the development of at least one more urediospore generation than usual, but the rankness and succulence of the late tillers proved to be an ideal propagation medium for the development of stem-rust infection. Favored by moderate temperatures, heavy rains and frequent dews, the fungus increased rapidly and abundantly during the period from June 1 to July 10.

Source of Stem-rust Inoculum

Although no slides were exposed for the trapping of rust spores in 1935, circumstantial evidence clearly indicates that stem rust was blown into Kansas from the south. There is no evidence to show that Kansas barberries played a part in the 1935 epidemic. Barberries seldom escape from cultivation in Kansas, and, except for occasional bushes in the northern tier of counties, those in ornamental plantings seldom are infected with rust.

Numerous detailed barberry surveys have been made in Kansas during favorable seasons for rust infection. The number of infected barberry plants that have been found has been so small and the infection so light that this source of inoculum is negligible in wheat infection. Furthermore, infected barberry plants did not occur in southern Kansas where stem rust first appeared in the State. This, coupled with the fact that aecia of stem rust of rye, rather than of wheat, have been found on barberries in Kansas 2/ is convincing evidence that the stem rust of wheat inoculum comes from sources other than the barberry.

Overwintering of urediospores in Kansas also was not a source of inoculum for the 1935 epidemic. There was practically no stem rust in the State in 1934 and no infection appeared on the 1935 crop in the fall of 1934. Had there been any appreciable amount of overwintering, stem-rust infection would have appeared earlier in the more humid localities of the State than it did in the spring of 1935.

On June 1 the senior writer observed very heavy stem-rust infection on winter wheat at Denton in north-central Texas. By June 20 stem rust had almost destroyed winter wheat in that locality. The daily weather maps published by the U. S. Weather Bureau show that winds blew from south to north over the area between central Texas and northern Kansas on 8 days of May and 13 of June. The average velocity of those winds for May was

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2/ Peltier, G. L. Physiologic forms of wheat stem rust in Kansas and Nebraska. Phytopathology 23:343-356. 1933.

13.5 miles per hour at Wichita, Kansas, and 14 miles per hour at Concordia, Kansas. The southerly winds of June had an average velocity of 12 miles per hour at both of those stations. At an average rate of 13 miles per hour spores could easily be carried the distance of approximately 600 miles from northern Texas to northern Kansas in a period of two days. It seems unlikely, however, that spores borne for such a distance were responsible for the 1935 epidemic. It seems more likely that the infection advanced gradually from the south following the development of favorable weather and crop conditions. Heavy infections were reported in south-central Kansas during the second week in June and rust appeared there about May 25. At Manhattan, stem rust appeared on June 5 and developed to epidemic proportions by June 15. The infection did not reach its maximum severity until June 25 however.

Distribution, Prevalence, and Severity of Stem Rust

For the first time in many years stem rust was found in all parts of the State. Even in the few surviving fields in the drought-affected area of the extreme southwestern part of the State stem rust was reported present. The disease reached its greatest prevalence and severity in the extreme northwestern counties, the central section, the adjoining edge of the eastern section and in the Kaw River Valley (Fig. 3). In those areas infections reached a severity of 60-80 percent and nearly all fields were infected. The epidemic was late in its appearance on wheat on fallow in the northwestern counties but practically ruined the crop in ten days after its appearance. Reports of rust damage were first received from Cheyenne County on July 2; by July 12 many fields were so severely damaged they could not be profitably harvested. In southeastern Kansas infections were light and they were light in most of the southwestern counties except in occasional fields in favored localities where wheat made good growth. Such fields frequently were heavily infected.

Magnitude and Types of Losses

Losses varied considerably according to locality and crop conditions and it is difficult to reach a single figure for the State. An estimate of an average loss of 12 percent for the State has been made but that figure probably is too low, for it includes only actual losses in yield and those due to lowering of the grade by low test weight of the grain. A total loss of about 15 percent would, therefore, seem to be a reasonable figure.

The heaviest losses occurred in the small area in the extreme northwestern part of the State where wheat on fallow promised yields of 20 bushels per acre or more until stem rust appeared early in July.

Many fields in that area did not yield sufficient to cover harvesting costs, yields often running as low as 3 or 4 bushels per acre of lightweight grain. Throughout the area shown by Figure 3 to have heavy stem-rust infection, losses were severe, especially losses in grade, and yields probably were reduced 20 percent or more.

An unusual situation developed in the area shown in Figure 2, where wheat was severely injured by winter and early spring drought and then partially recovered after the rains began. Such wheat was green and succulent during the last half of June and by June 25 most of it was heavily infected with stem rust. Before the rust developed, many farmers who had once given up hope of a wheat crop estimated that the revived fields would yield 5 to 10 bushels per acre. Shortly after heavy stem rust appeared a severe heat wave developed and the rust and heat together practically destroyed those late fields. The severe heat of the first two weeks in July seriously injured much wheat in Kansas.

Just how much of the total loss in Kansas in 1935 was due to stem-rust infection and how much to heat damage is difficult to say. The estimate recently made by Peltier <u>et al</u> 3/ to the effect that about half of the damage in Nebraska was caused by stem rust and half by extreme heat, would seem to be fairly reasonable for Kansas also. Considering the severity of the stem-rust infection in most parts of the State at the time the extreme heat began, it seems practically certain that the loss from stem rust alone would have been as great as the combined rust and heat injury had the heat wave not occurred and the conditions remained favorable for the rust.

Four distinct types of losses from stem rust were observed in Kansas in 1935. These were as follows:

1. <u>Reduction in Actual Yield per Acre</u>. It has been estimated that about 8 percent of the total loss estimated was of this order. That figure unquestionably is much too low for some localities, however.

2. <u>Reduction in Grade Due to Shriveling</u>. The loss due to this factor was placed at 4 percent, which seems low in view of the fact that very little plump wheat was produced in Kansas in 1935. In the western part of the State some of the grain tested only 45 pounds per bushel and great quantities from all sections tested only 54 to 56 pounds. Much of this damage, however, was caused by heat and drought.

3. <u>Abandonment due to Stem-Rust</u>. Although no figure is given for this type of loss, it was an important factor in 1935. In northwestern

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3/ Peltier, G. L., Marion Yount, and C. A. Suneson. The stem rust epidemic of 1935 in Nebraska. Plant Disease Reporter Sup. 91, May 1, 1936.

Kansas and in the drought-injured area stem rust so injured many fields that the owners did not harvest them.

4. Losses in the Succeeding Crop Due to Poor Seed. This factor has not been measured, but was observable in some parts of Kansas in the fall of 1935. Seed from stem-rust-injured fields was often badly shriveled and produced small weak seedlings that failed to start growth promptly. Stands in such fields were thin and the plants were weak and in poor condition to go into the winter.

Field Reaction to Stem Rust of Commercial Wheat Varieties

It frequently has been said that the hard red winter wheats, as a group, are somewhat resistant to stem rust. In the epidemic of 1935, however, such resistance was not observed, since in large areas, Turkey, a typical hard red winter variety, was heavily attacked by stem rust. While no stem-rust notes on varieties of wheat were taken in different parts of the State, casual observations indicated that the varieties grown commercially fell into the following categories:

	Hard Red Winter	Soft Red Winter
Heavily rusted	Turkey Kharkof Cheyenne	Fulcaster Harvest Queen
Moderately rusted	Kanred Tenmarq	Michigan Wonder
Lightly rusted	Iobred Blackhull	Kawvale (semihard)
Escaped	Early Blackhull	Currell

These observations are supplemented by readings made on varieties grown in triplicate fortieth-acre plots at the Agronomy Farm, Manhattan, Kansas. The data are presented in Table 4.

The low reading for Early Blackhull is believed attributable principally to the fact that the variety escaped infection rather than that it possesses resistance. This is shown in plots where sowings were made at weekly intervals beginning September 5, and ending November 2. In those tests it had on July 2 only 10 percent infection in the earliest sowing and 35 percent in the latest sowing. Early Blackhull is the earliest maturing variety grown commercially in Kansas and, because of early maturity, will seldom show more than a trace of stem rust

Table 4. Reaction to stem rust of important varieties of winter wheat grown in triplicate fortieth-acre plots at the Agronomy Farm, Manhattan, Kansas, 1935.

Class and variety	C.I.No.	Average percentage of stem rust	Class and variety	C.I.No.	Average percentage of stem rust
Hard Red Winter			Semihard Red Winter		
Early Blackhull	8856	5	Kawvale	8180	22
Blackhull	6251	13	Soft Red Winter		
Kanred	5146	15	Fulcaster	6471	30
Tenmarq	6936	15	Clarkan	8858	33
Turkey	1558	23	Harvest Queen	6199	35
Kharkof	1442	28			
Oro	8220	42			
Cheyenne	8885	50			

under field conditions. Later maturing varieties such as Turkey, Kharkof, Oro, and Cheyenne will occasionally be found heavily infected. Although Kawvale rusted moderately in the Agronomy Farm test as shown in Table 4, it exhibited marked freedom from rust in most commercial fields in the eastern half of the State. Its reaction apparently was due to a combination of some inherent resistance and of escape through early maturity. The variety also possesses a strong straw and did not lodge, a characteristic that also reduced the amount of stem-rust infection.

Iobred and Blackhull, hard red winter wheats known to possess definite but not high resistance to stem rust, exhibited that characteristic in the field in 1935. Iobred, grown only in the northeastern counties, was practically free from stem rust. However, infection in general was light in that part of the State. Blackhull, grown principally in south-central Kansas, frequently had considerable stem rust, as indicated in Table 4, but the character of the infection indicated some resistance. The variety often was attacked less severely than adjacent fields of Turkey. Kanred and Tenmarq are known to have resistance to some physiologic races of stem rust and also to possess adult plant resistance to

several others. In the northwestern counties Kanred was heavily attacked in 1935 but in other localities both varieties exhibited some resistance.

Among the soft red winter varieties, grown commercially in Kansas, there is little if any resistance to stem rust. Currell, which is grown in the southeastern counties, usually escapes infection through its early maturity. Harvest Queen and Fulcaster, the two most widely grown varieties, are very susceptible.

Stem Rust on Other Crops

Stem rust was not a major factor in the yield of other cereal crops in Kansas in 1935. A severe local infection of stem rust damaged oats in the vicinity of Manhattan but only light infections occurred elsewhere. Barley, which was heavily rusted in Nebraska, was only very lightly infected in Kansas. Rye was practically free from stem-rust infection in all but occasional fields where traces could be found.

Summary

The stem-rust epidemic of 1935 in Kansas was the first epidemic of major importance since 1923 and was the most severe and destructive since that of 1904. A survey of the causal factors and their interrelation leads to the conclusion that the proper combination of the following factors was responsible for the epidemic:

1. Heavy infection of very susceptible wheats in north central Texas.

2. Prevailing southerly winds of the central plains area which carried rust spores into Kansas during May and June.

3. Heavy and frequent rains, high relative humidities, frequent dews, and favorable temperatures during the last half of May and all of June.

4. Late tillering and heading due to early spring drought.

5. A long fruiting period brought about by heavy rains and subnormal temperatures of May and June.

6. Susceptibility of commercial wheat varieties in Kansas.

Observations extending over several years have clearly shown that stem rust of wheat overwinters with annual regularity in central and southern Texas and that the susceptible Mediterranean wheat of north central Texas furnishes an ideal propagation ground. This being the case severe epidemics of stem rust can be expected to sweep northward through the plains area whenever the proper sequence of favorable conditions occurs. The experience of 1935 would indicate a definite need for stem-rust resistant varieties both for north central Texas and for the hard red winter wheat growing area of the central plains.

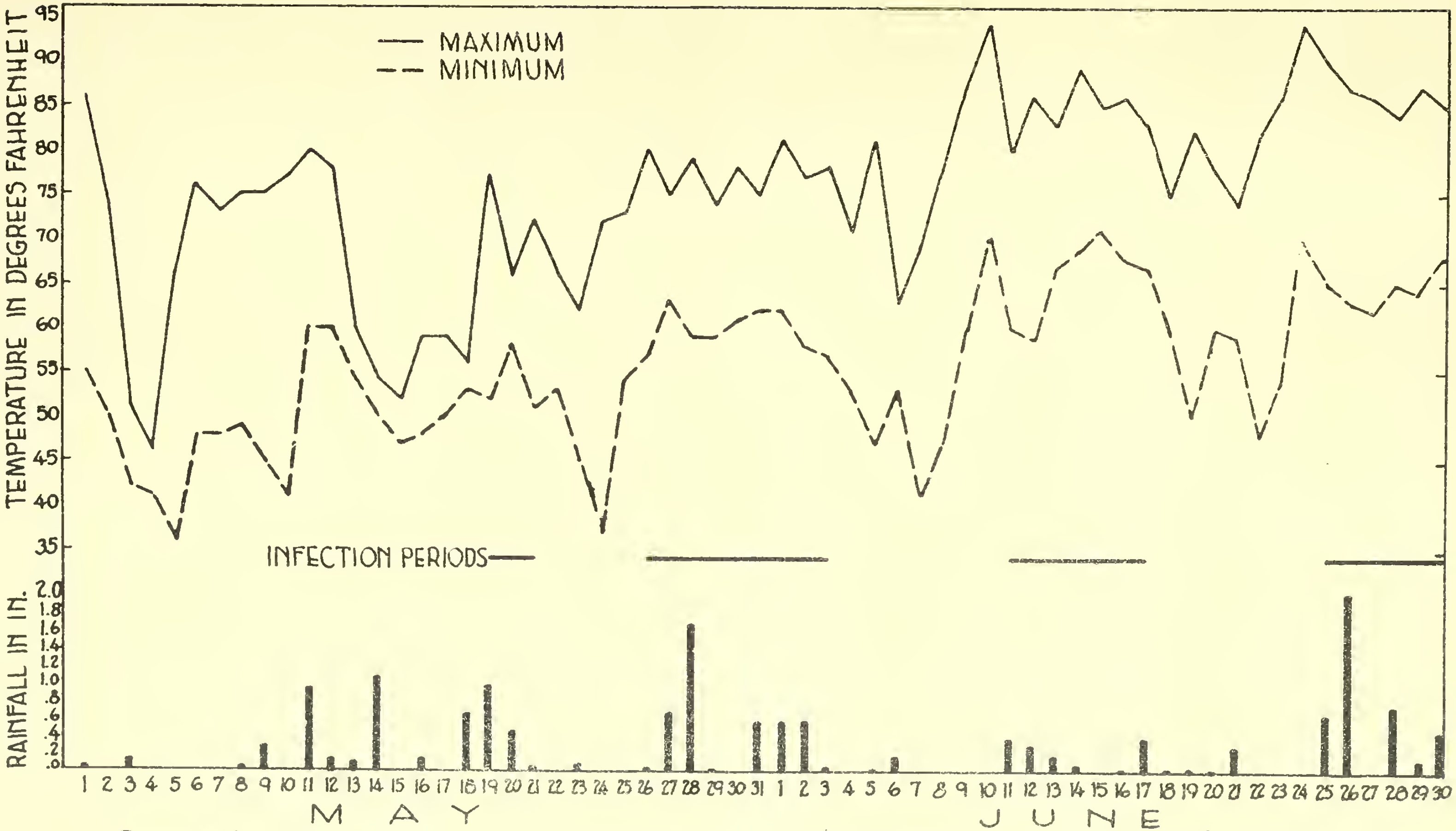


Figure 1. Maximum and minimum air temperatures, rainfall, and periods favorable for the development of stem rust at Manhattan, Kansas, in 1935.

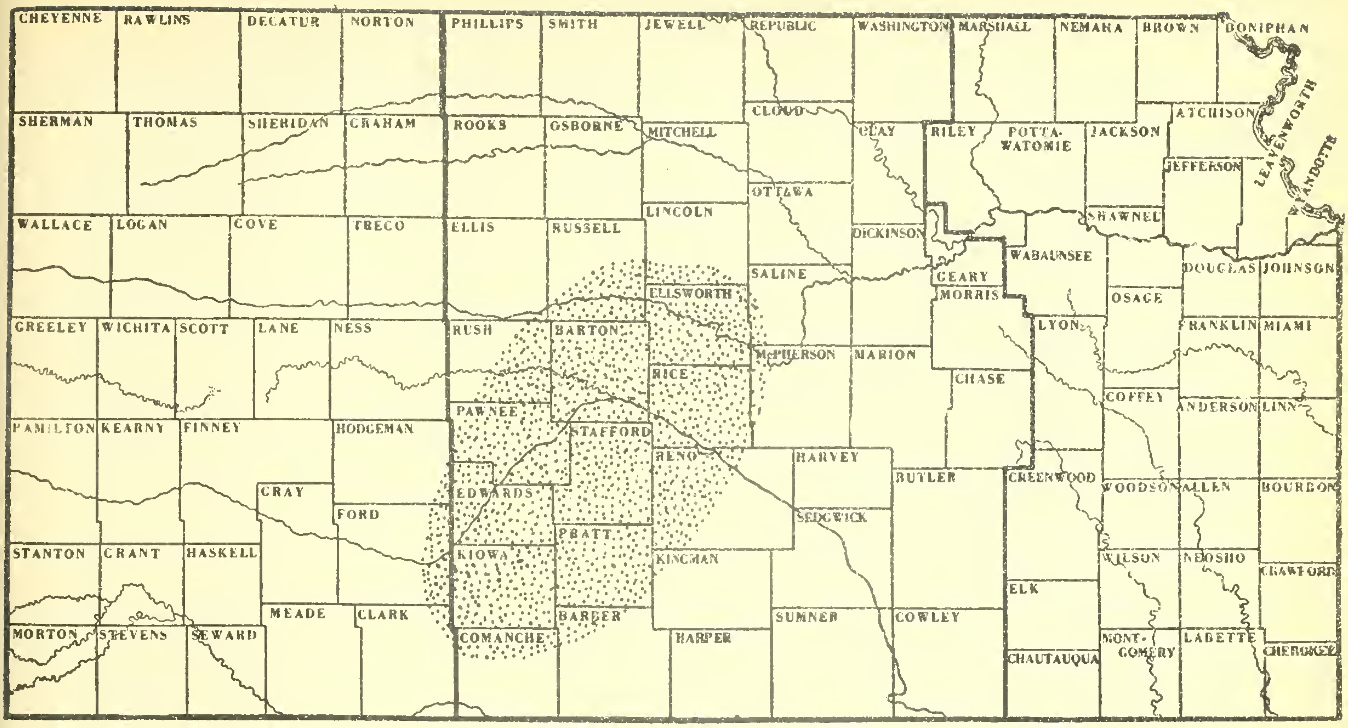
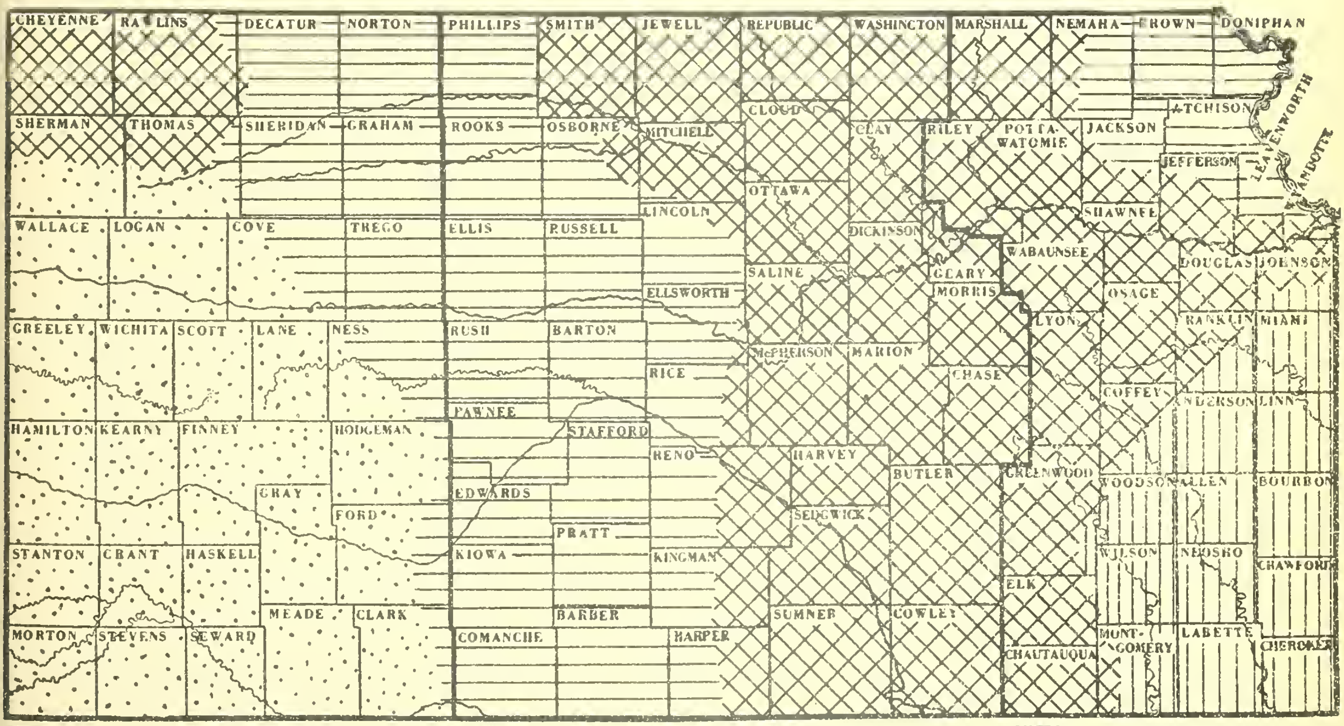


Figure 2. The section of Kansas where winter wheat was seriously injured by winter and early spring drought but made a late growth after rains began in May, 1935.



VERY HEAVY MODERATE TO HEAVY LIGHT TO MODERATE LIGHT TO VERY LIGHT

Figure 3. Distribution and severity of stem rust on winter wheat in Kansas in 1935.

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ECOLOGICAL FACTORS IN NORTH TEXAS RELATED TO THE 1935 STEM RUST EPIDEMIC

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BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

ECOLOGICAL FACTORS IN NORTH TEXAS RELATED TO THE 1935 STEM RUST EPIDEMIC 1/

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Introduction

Stem rust (*Puccinia graminis tritici* Eriks. and Henn.) is one of the most destructive and widespread diseases attacking the wheat plant. Official estimates of losses from stem rust in the United States may be obtained from various sources and will not be given here. The 1935 epidemic was one of the most destructive in history and extended over most of the wheat-growing areas of the United States.

The two wheat rusts, stem rust (*Puccinia graminis tritici*) and leaf rust (*Puccinia triticina*) are of major economic importance in Texas. These diseases limit the production of wheat in Texas to the more north-central parts of the State and to regions of lower rainfall in the western part, where rust usually is not a factor. The estimated annual loss from stem rust in Texas from 1925 to 1934 was 359,000 bushels, while that caused by leaf rust was 388,200 bushels 3/. Stem rust is every year a limiting factor in wheat production from central Texas southward. In north-central Texas the disease is present nearly every year, but often is not a major factor in yield because of the early maturity of the crop. Because of the extensive wheat acreage, however, this area serves as a breeding ground for stem rust and increases the inoculum to be carried northward as the season progresses. During mild winters stem rust may actually overwinter in this area.

1/ A report of cooperative investigations between the Division of Cereal Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture, and the Texas Agricultural Experiment Station at Texas Substation No. 6, Denton, Texas.

2/ Thanks are due Mr. P. B. Dunkle, Superintendent of Substation No. 6, Denton, Texas, and the Texas Agricultural Experiment Station for permission to use unpublished meteorological data as given in this report.

3/ United States Department of Agriculture, Bureau of Plant Industry, Division of Mycology and Disease Survey, Plant Disease Reporter Supplements 49, 56, 64, 83, 87, and 89. Reports of losses from diseases in the United States for the years 1925 to 1934 inclusive.

Since the north Texas area is so important from a national standpoint in the early season development of an epidemic, any information relative to ecological factors previous and co-incident to the development of the 1935 stem rust epidemic in Texas is in turn related to the spread of the disease throughout much of the United States. Data on meteorological and ecological conditions in Texas as related to the 1935 stem rust epidemic are therefore presented.

Epidemiology Of Stem Rust At Denton, Texas, In 1935

Stem rust was first observed at Texas Substation No. 6, Denton, Texas, on May 7. It is possible that there may have been some points of infection in North Texas prior to this time and perhaps even some overwintering in the area. General infection did not start until about this date. Previous to this time, as will be pointed out later, weather conditions were not favorable for the development and spread of the disease.

Meteorological Factors Affecting The Stem Rust Epidemic

General Weather Conditions: All climatological data that might influence stem-rust infection and spread have been tabulated in Table 1. Data are given for the months of April, May, and June for the years 1931 to 1935 and averages for a 21-year period. Daily temperature and humidity for 1935 are presented in later tables and graphs. The rust data here presented are taken from the field-plat variety test of 18 varieties grown during the 5-year (1931-35) period.

Temperature: Numerous investigations have shown that temperature is one of the most important factors in the development and spread of a stem-rust epidemic. In the present study the mean daily temperature, as well as the morning temperature, has been considered. Data are presented in Figure 1 showing the daily mean temperature for the months of April, May, and June. This period includes the period from the booting stage of the grain until it is fully matured. Monthly mean temperatures for 1935 and for a 21-year period are shown for comparison.

The first stem rust was observed at Denton, Texas, on May 7, 1935. As the incubation period for stem rust varies from one to two weeks, it would have been necessary for the general infection to have taken place

during the last week of April. Peltier 4/, 5/, 6/, 7/ and Stakman and Lambert 8/ have shown that the optimum temperature for rust infection is about 68° F., although if there is free moisture and the humidity of the air is high, infection may take place at temperatures of 50° to 75° F. A study of Figure 1 shows that the mean daily temperature during the last week of April was favorable for rust infection. During the first week of May, temperatures were below normal and not so favorable for rust infection. Following this period, temperatures were favorable for rust infection and development throughout the remainder of the growing season. Detailed meterological data, including temperature, taken at the morning reading, are presented under a separate heading because of the importance of this period of the day in rust infection.

Humidity and Precipitation: Humidity is no doubt second only to temperature as a factor controlling the germination of rust spores and subsequent infection of the wheat plant. Since humidity and precipitation are often closely allied they will be considered together.

In Figure 2 the mean daily relative humidity for each day of the three-month period, April 1 to June 30, is shown. Precipitation during the period also is shown. Monthly precipitation compared with the normal was given in Table 1.

4/ Peltier, George L. A study of the environmental conditions influencing the development of stem rust in the absence of an alternate host I. Nebr. Exp. Sta. Res. Bul. 22. 1922.

5/ Peltier, George L. A study of the environmental conditions influencing the development of stem rust in the absence of an alternate host II. Nebr. Exp. Sta. Res. Bul. 25. 1923.

6/ Peltier, George L. Relation of weather to the prevalence of wheat stem rust in Nebraska. Jour. Agr. Res. 46:59-73. 1923.

7/ Peltier, George L. Some aspects of the spread of stem rust. Zentralbl. Bakt. II Abt., 78:525-535. 1929.

8/ Stakman, E. C., and E. B. Lambert. The relation of temperature during the growing season in the spring wheat area of the United States to the occurrence of stem rust epidemics. Phytopathology 14:94-100. 1924.

Rainfall for the month of April was about normal in total amount but it all occurred after April 18. Previous to this there was a time interval in March and April when there was insufficient moisture for the crop. During that period conditions were not favorable for rust infection. After rains started in April, both humidity and temperature were favorable for rust infection and spread.

A total of 11.52 inches of precipitation was recorded during May, a record amount for that month. A measurable amount of precipitation occurred on 13 days of the month. This unusual amount of moisture promoted continued growth of the wheat crop for a longer than normal period, and thus delayed heading and maturity. Associated with the large amount of precipitation of May were extremely high relative humidity and subnormal temperatures. The mean daily humidity did not fall below 66 percent at any time during the month. The mean, 83.2 percent, for the month is 13.3 percent above normal. The conditions, therefore, were favorable for rust infection throughout the month.

Because of extremely late maturity of the crop, June weather was a factor in rust development this season, whereas, normally, it would not be. Precipitation in June was 5.27 inches compared with the normal of 2.85 inches. The relative humidity was never below 64 percent and the mean relative humidity of 77.9 percent was 13.4 percent above normal.

From the above study of humidity and precipitation during the period when the wheat plants were susceptible to rust, it is evident that conditions were extremely favorable in 1935 for the development of a rust epidemic. The excessive precipitation and high humidity contributed much to the delay in ripening of the grain and thus furnished ample time for the epidemic to develop in northern Texas and provide inoculum for the continued spread of the disease in other states.

Temperature and Humidity at Time of the Morning Reading: Environmental factors are usually most favorable for rust infection early in the morning. Because of this it was considered desirable to study, in addition to mean daily temperatures and relative humidity, the temperature and humidity at the morning reading. This reading is taken at 7 o'clock. In Figure 3 the relative humidity and temperature at the morning reading for the period April 1 to June 30 are shown. Days on which dew occurred are shown also.

Previous to April 18 conditions were not very favorable for germination of rust spores. Temperatures were favorable on certain days, but often when the temperature was favorable, the humidity was fairly low. Dews also were less frequent than later in the season.

Table 1. Climatological data recorded at Texas Substation No. 6, Denton, Texas, for the years 1931 to 1935, inclusive, and averages 1914 to 1935.

	1931			1932			1933			1934			1935			Average 1914-1935		
	Apr.	May	June	Apr.	May	June	Apr.	May	June	Apr.	May	June	Apr.	May	June	Apr.	May	June
Mean maximum temperature	71.9	78.5	93.7	78.7	81.9	90.8	79.4	84.6	93.7	76.8	84.8	97.6	75.7	77.0	87.1	76.0	81.0	91.8
Mean minimum temperature	47.4	55.2	68.6	52.0	59.7	68.9	50.5	63.5	66.2	54.4	60.0	71.9	51.6	59.0	66.4	51.8	59.9	68.8
Mean monthly temperature	59.7	66.8	81.2	65.4	70.8	79.8	64.9	74.1	80.0	65.6	72.4	84.8	63.7	68.0	76.8	63.9	70.8	80.1
Mean relative humidity	74.7	74.6	63.8	64.1	74.3	73.8	60.3	73.4	56.1	72.2	66.1	50.7	72.0	83.2	77.9	67.1	72.0	64.5
Total evaporation-inches	4.02	5.24	7.40	5.66	5.61	6.48	5.84	5.91	8.43	4.68	6.21	10.1	4.47	4.67	6.23	5.09	5.65	7.51
Total precipitation-inches	1.71	2.19	1.37	1.96	4.57	4.82	2.24	5.22	.05	4.19	4.24	.23	3.54	11.52	5.27	3.82	4.63	2.85
Number days with .01 inch or more precipitation	8	8	7	6	7	9	5	8	1	8	6	1	10	13	10	7.9	8.4	6.5
Number of clear days	12	14	15	16	16	14	16	16	28	12	21	30	13	11	14	13.7	14.6	17.8
Number of cloudy days	8	7	2	5	9	1	2	7	0	8	6	0	10	11	8	6.8	6.8	2.7
Number partly-cloudy days	10	10	13	9	6	15	12	8	2	10	4	0	7	9	8	9.6	9.6	9.5
Number days dew	16	16	10	8	19	18	15	20	16	19	26	4	10	22	21	-	-	-
Mean monthly daily wind movement	138	136	143	227	138	164	176	157	121	166	128	337	212	192	149	243	183	176
Number days wind from south (include SE and SW)	13	13	25	19	11	17	14	17	23	18	17	28	17	20	21	17.7	19.1	23.9
Date on which first stem rust was observed		20			9			17			11			7				
Percentage of rust in 18 wheat varieties																		
Average-%		7			25			28			19			82				
Range -%		0 to 27			1 to 51			0 to 63			0 to 65			20 to 99				

Table 2. Total daily wind run at Texas Substation No. 6, Denton, Texas, during April, May, and June, 1935 with comparisons with normal.

Date	April Total wind run	April Direction	May Total wind run	May Direction	June Total wind run	June Direction
1	157	SE	299	SE	176	SE
2	213	NW	192	SW	213	SE
3	276	N	248	N	142	NE
4	167	SE	387	NE	122	NE
5	240	SE	264	NW	96	SE
6	147	NW	58	SE	127	SE
7	405	NW	197	SE	148	NE
8	117	SE	227	SE	92	NE
9	285	SE	154	SE	117	SE
10	257	NW	162	SE	112	SE
11	371	NW	205	SE	63	N
12	344	NW	203	SE	99	SE
13	82	SW	230	SE	100	SE
14	248	SW	182	SE	136	SE
15	326	NE	200	NE	184	SE
16	107	SE	183	NE	294	SE
17	326	SE	191	E	253	SW
18	161	SE	185	SE	121	NW
19	273	NW	140	SE	64	SE
20	192	NW	83	NW	251	S
21	105	SE	161	NW	237	E
22	109	SE	87	NE	124	NE
23	218	SE	159	NE	108	SE
24	313	SE	179	NE	206	SE
25	186	NE	140	SE	244	SW
26	106	NE	208	SE	165	NW
27	49	SE	239	SW	76	SE
28	127	SE	246	SE	101	SE
29	276	NW	216	SE	124	SE
30	180	SE	160	SE	165	SE
31			163	SE		
Total	6363		5948		4460	
Mean	212		192		149	
21-year mean	227		184		175	

As previously mentioned, it appears that the initial general infection must have taken place during the last week of April. As shown in Figure 3, both temperature and humidity were favorable during this period, and dew was present nearly every morning. Following this initial infection, the temperatures were not so favorable during the first week of May. On May 7 the first rust was observed and from that time supplied inoculum for spread of the disease. Following this initial appearance of the disease, environmental conditions were exceptionally favorable throughout the remainder of the growing season for development and spread of rust.

Wind Movement: Because of the importance of wind movement and direction in the spread of rust to other wheat-growing areas, no report of meteorological conditions would be complete without reference to wind movement. The total wind movement for each daily 24-hour period from April 1 to June 30 is given in Table 2.

Wind movement during April, May, and June was nearly normal; there were no great extremes, although there were several days when it was strong enough to carry rust spores long distances.

Previous to the initial general infection at Denton, Texas, fairly strong winds from the south occurred on April 5, 9, 19, and 24. Later in the season there were a number of days when the wind could easily have carried spores to states to the north of Texas and thus contribute to the national epidemic.

Crop-Growth Factors Favoring Stem Rust Infection

The late maturity of the wheat crop in north Texas was one of the most important factors in the severity of the disease in the State and provided inoculum over a long period for spread to states to the north. In Table 3 dates of heading, date of ripening, and length of fruiting period are given for the years 1933 to 1935, inclusive, for the varieties of wheat grown in the field-plat variety tests at Denton.

Lateness of Heading: Date of first heading in 1935 was from 2 to 15 days later than in the spring of 1934, a fairly normal season. This late heading in 1935 resulted from a combination of several factors. Stands were thin as a result of winterkilling. The meteorological factors previously discussed, namely, excessive precipitation; cool, cloudy weather; and high humidity, combined with the thin stands, caused continued vegetative growth. The retarding effect of these factors was very evident in the manner in which the grain headed. Although wheat varieties normally reach full head in 3 to 5 days after first heads appear, in 1935 the plants were not fully headed until 8 to 13 days after

Table 3. Date of heading, date of ripening and length of fruiting period of winter-wheat varieties grown at Denton, Texas, 1933 to 1935, inclusive.

Variety	T. S. No.	C. I. No.	1933 Date First head	1933 Date Fully ripe	1933 Fruiting period, days	1934 Date First head	1934 Date Fully ripe	1934 Fruiting period, days	1935 Date First head	1935 Date Fully ripe	1935 Fruiting period, days
Early blackhull	15838	8858	4-27	5-30	33	4-24	6-1	38	4-29	6-3	35
Quivira	15833	8886	5-3	6-6	34	4-28	6-2	35	5-3	6-11	39
Sutton	15832	10053	5-12	6-8	27	5-7	6-6	30	5-14	6-17	34
Denton	9236	8265	5-9	6-8	30	5-5	6-6	32	5-16	6-17	32
Mediterranean	3015-81	10086	5-8	6-9	32	5-1	6-3	33	5-16	6-17	32
Mediterranean	3015-105-1	11587	5-8	6-7	30	5-2	6-2	31	5-11	6-14	34
Mediterranean	5933-20	10085	5-6	6-4	29	4-29	6-2	34	5-8	6-14	37
Mediterranean	5933-23	11525	5-6	6-6	31	5-2	6-4	33	5-11	6-14	34
Mediterranean	5933-34	11526	5-6	6-4	29	-30	6-3	34	5-8	6-14	37
Mediterranean	5933-38		5-5	6-4	30	5-1	6-4	34	5-9	6-13	35
Nebraska 60	15835	6250	5-12	6-10	29	5-9	6-9	31	5-14	6-17	34
Kharkof	16830	1442	5-12	6-9	28	5-9	6-9	31	5-13	6-18	36
Blackhull	7172	6251	5-9	6-7	29	5-7	6-7	31	5-12	6-15	34
Kanred	11763	5146	5-10	6-7	28	5-9	6-8	30	5-11	6-14	34
Tenmarq	12578	6936	5-8	6-7	30	5-7	6-6	30	5-10	6-15	36
Fulcaster	7082	6471	5-9	6-7	29	5-6	6-7	32	5-12	6-16	35
Clarkan	20400	8858	5-8	6-6	29	5-7	6-6	30	5-12	6-17	36
Harvest Queen	15837	6199	5-10	6-8	29	5-7	6-6	30	5-12	6-15	34
Kawvale	12577	8180	5-8	6-7	30	5-5	6-6	32	5-13	6-17	35
Mean length of fruiting period					30			32			35

the first heads emerged. The average date of first heading was about May 10, whereas the mean date of full heading was May 22, or 12 days later.

Delayed Maturity: As previously discussed, the excessive precipitation, high humidity, and cool temperatures continued throughout May and most of June. These conditions, together with thin stands, delayed the maturity of the grain. As shown in Table 3, the date of ripening in 1935 is in most instances 10 to 15 days later than in 1934. The wheat crop really did not mature even at this late date, but in most instances ripened because of rust damage. Harvest of small grains in the Denton area usually begins in late May and is nearly complete by June 10. In 1935 harvest of the experimental plots was not possible until June.

The above ecological conditions, which retarded the heading and ripening of the grain, were also favorable for the development of a stem-rust epidemic. The early infection and subsequent long period of development resulted in severe damage to the grain. The long period of development for rust was also a very important factor in the spread of rust to states to the north.

Effect Of The 1935 Stem-Rust Epidemic On Wheat Yields

In Table 1 the date of first appearance of rust, the mean infection, and the range of infection at the end of the season for the years 1931 to 1935 are given. In years prior to 1935, stem rust was not a major factor in reducing yields excepting those of certain very susceptible varieties. Often stem rust does not reach its maximum until the crop is almost mature and in such years the infection may be fairly high, but the damage to the grain is relatively small. In 1935, however, the amount of initial inoculum apparently was great, and, as conditions were very favorable for spread from the time the first rust appeared, varieties were soon highly infected. Furthermore, the late maturity of the crop enabled the rust to develop and spread, while the host plants were in a very susceptible condition, resulting in severe damage to the host plants. Estimates of stem rust were made on two dates in 1935. The first reading was made on May 29 about a week after wheat had reached full head. The second reading was made near maturity. Agronomic data on rust infection, winter survival, yield of grain, and test weight of grain are given in Table 4.

Yield and plumpness of grain as indicated by test weight were closely associated in 1935 with early maturity and susceptibility to stem rust. Extremely susceptible varieties, such as Fulcaster, Harvest Queen, Sutton, and the Mediterranean strains, were highly infected with

Table 4. Yields and agronomic data for winter wheat varieties grown at Denton, Texas, 1935.

Variety	T. S. No.	C.I. No.	Date first head	Estimated percent winter survival	Percent Rust: Leaf	Percent Rust: Stem 5-29	Percent Rust: Stem Maturity	Yield of grain Bu. per acre	Test weight lbs.
Early Blackhull	15838	8856	4-29	42	58	3	20	14.1	55
Quivira	15833	8886	5-3	67	13	7	65	13.1	50
Kanred	11763	5146	5-11	82	75	7	60	8.8	45
Kharkof	16830	1442	5-13	90	85	9	90	8.7	44
Mediterranean	5933-20	10085	5-8	63	25	57	80	8.6	46
Clarkan	20400	8858	5-12	68	55	55	90	8.6	50
Mediterranean	5933-34	11526	5-8	57	13	68	80	8.3	43
Mediterranean	5933-38	-	5-9	48	6	78	90	8.0	46
Kawvale	12577	8180	5-13	50	4	20	80	7.6	40
Turkey Selection	20374	10016	5-9	78	99	8	85	6.9	46
Blackhull	7172	6251	5-12	58	70	15	75	6.9	48
Tenmarq	12578	6936	5-10	67	33	25	75	6.7	38
Nebraska 60	15835	6250	5-14	83	90	32	90	5.0	46
Fulcaster	7082	6471	5-12	40	45	48	99	4.9	42
Harvest Queen	15837	6199	5-12	62	99	55	99	4.5	47
Mediterranean	5933-23	11525	5-11	47	6	85	99	4.5	44
Mediterranean	3015-105-1	11587	5-11	52	4	99	99	3.4	40
Sutton	15832	10053	5-14	40	38	58	99	3.4	41
Denton	9236	8265	5-16	32	13	40	99	2.7	39
Mediterranean	3015-81	10086	5-16	25	48	45	99	2.0	40

stem rust by May 29, or by the time they reached full head. The resulting yield was very low and test weight extremely low. Another factor that contributed to the low yield and late maturity of these strains was the lower survival. The thin stands not only retarded the development of the wheat plants, but also contributed to the low yield. The two early varieties, Early Blackhull and Quivira, were able to produce a fair yield of grain because of their ability to mature ahead of the severe rust epidemic. Kanred wheat showed some resistance to stem rust, at least in the early stages of the epidemic. Turkey Selection C.I. 10016 produced a low yield in spite of rather light stem rust infection and high winter survival. This was no doubt due to its extreme susceptibility to leaf rust.

Conclusion

In conclusion, it should be stated that no one factor of weather or condition of the crop was responsible for the severe rust epidemic. All the factors studied contributed their respective parts and, because of the manner in which they were associated resulted in one of the most severe rust epidemics in history. These factors also played their parts in the spread of the disease to other wheat-growing areas. Had the acreage of wheat in north central Texas not been reduced by winter-killing, the loss would have been even more serious.

Under the existing conditions, which included thin stands; late maturity of the crop as a result of thin stands, excessive precipitation, and high humidity; favorable temperatures and humidity for rust development; frequent dews; cloudy weather; and favorable winds to carry the rust spores to other localities and states; the rust epidemic in Texas served as a source of inoculum for an extremely long period of time and thus contributed to the epidemic in other states.

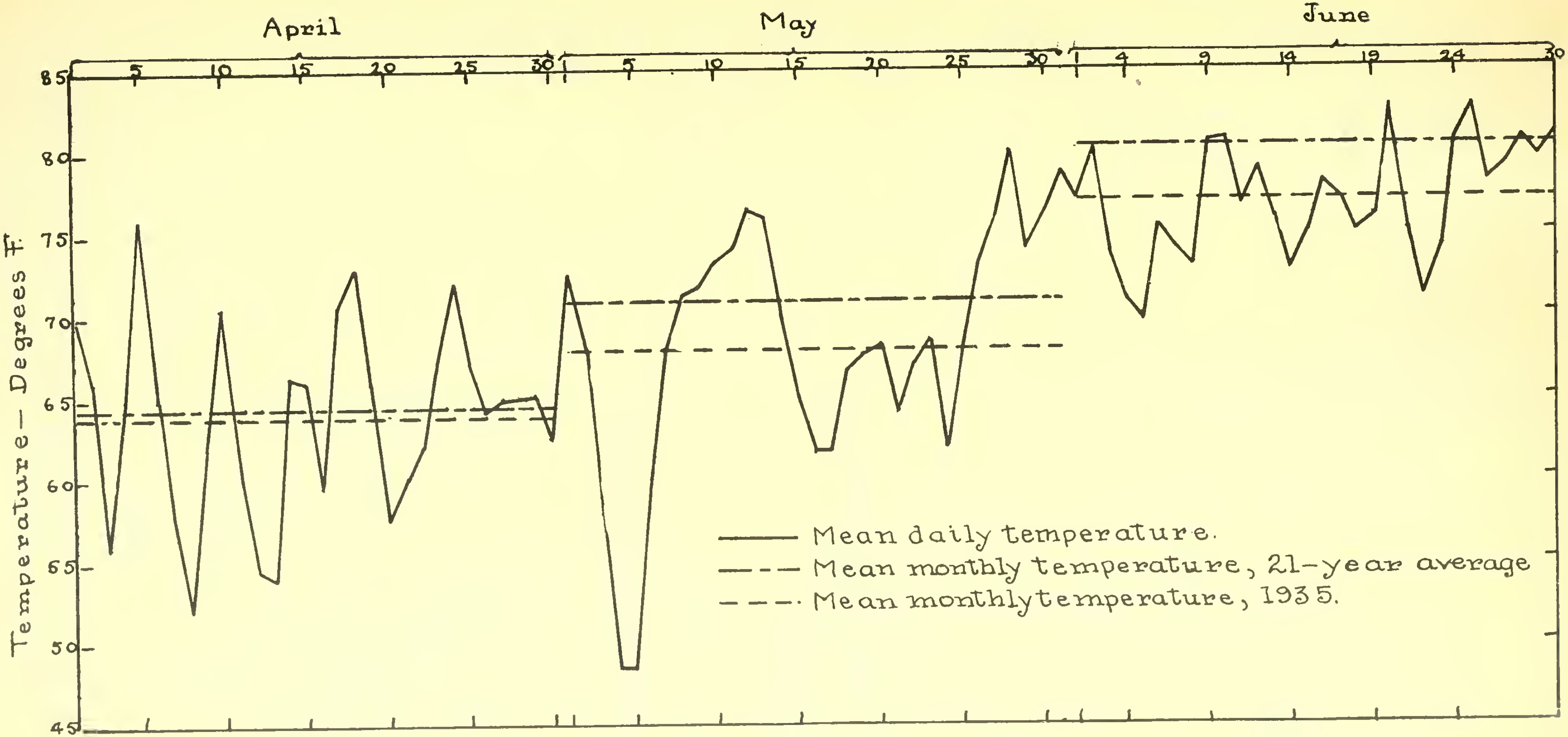

Figure 1 Mean daily temperatures, April, May, June, 1935, at Texas Substation No.6, Denton, Texas.

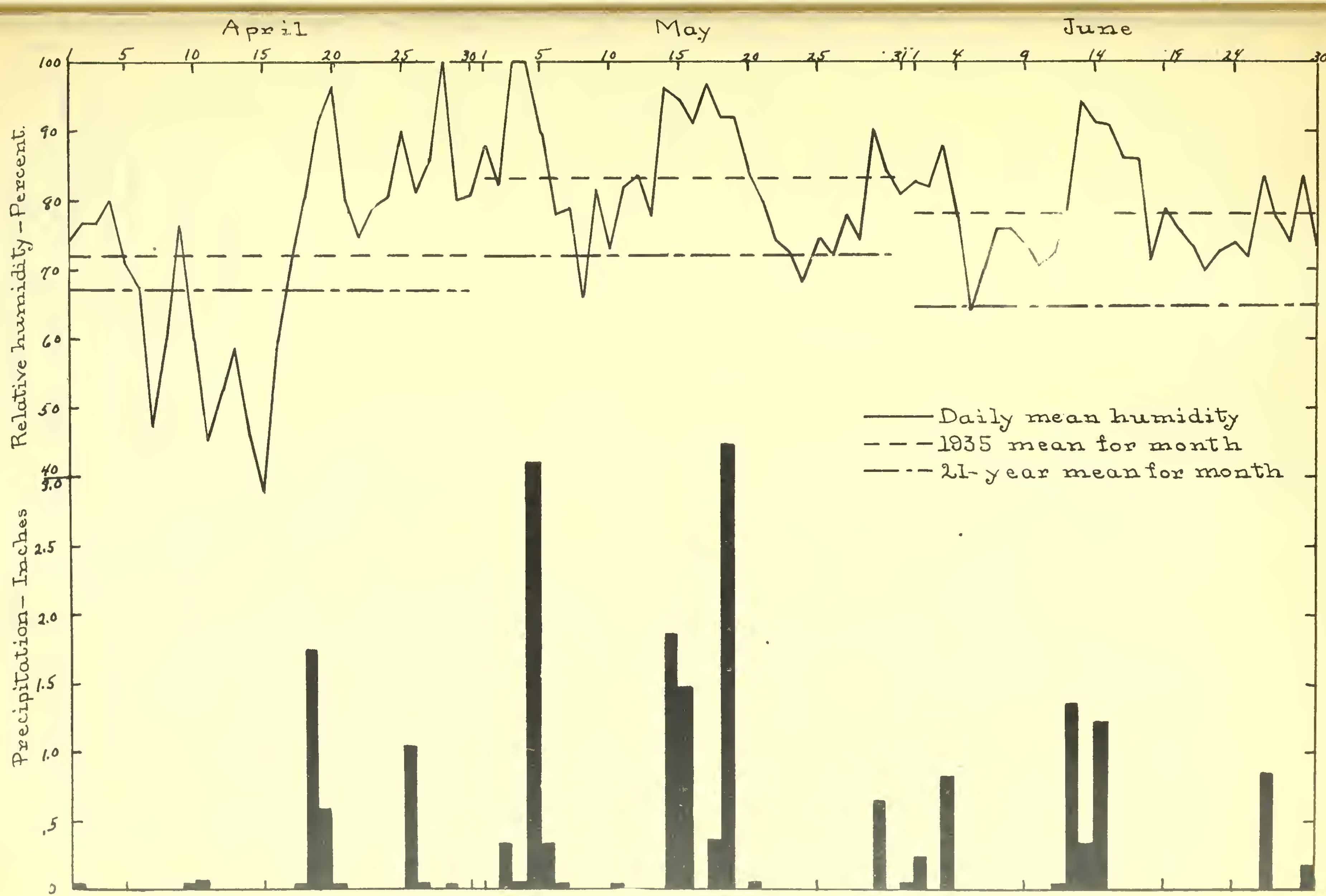

Figure 2. Mean daily relative humidity and precipitation, April, May, and June, 1935, at Substation No. 6, Denton, Texas

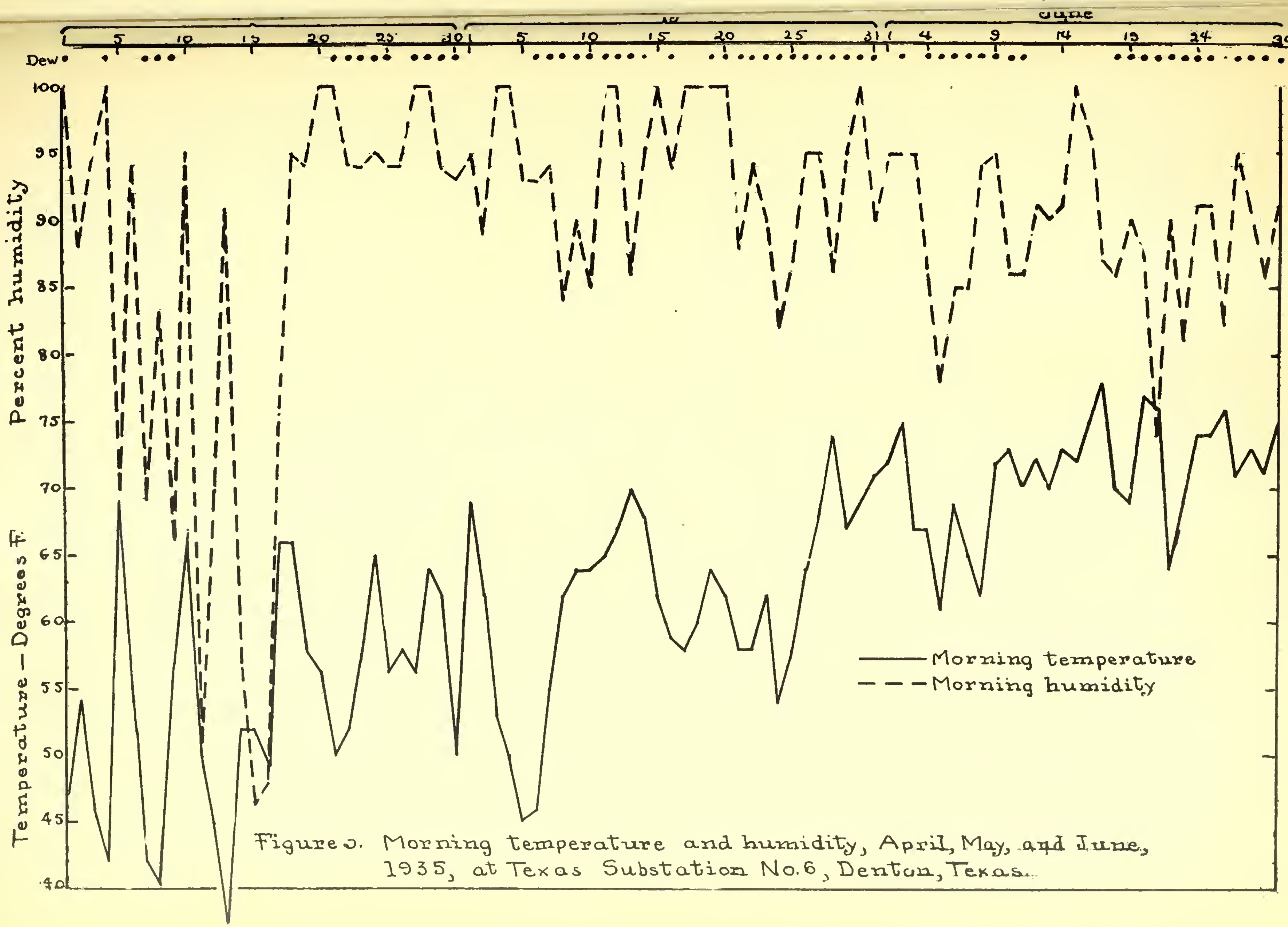

Figure 5. Morning temperature and humidity, April, May, and June, 1935, at Texas Substation No. 6, Denton, Texas.

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Supplement 94

Crop Losses from Plant Diseases in the United States

1935

October 31, 1936

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

ESTIMATES OF CROP LOSSES FROM DISEASES IN THE UNITED STATES IN 1935

Compiled by

H. A. Edson, Jessie I. Wood, and Nellie W. Nance

Plant Disease Reporter
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CONTENTS

Foreword 44
Wheat. 46
Barley 48
Rye. 50
Oats 51
Field Corn 52
Sweet Corn 54
Sweet Potato 55
Potato 56
Tomato 58
Snap Bean. 62
Dry Bean 64
Green Peas 65
Cotton 67
Sugar Beet 68
Pear 69
Apple. 70
Peach. 72
Cherry 73
Grape. 74
Strawberry 75

FOREWORD

It has been several years since the bases of these estimates and the method of their computation have been discussed. It is, therefore, thought advisable to repeat relevant portions of the explanation given in Supplement 83 (1932. Foreword by N. E. Stevens, pp. 1 - 3):

In conformity with previous practice, the estimates are expressed in percentage of loss, or in commercial units - never in dollars, because of complex economic considerations which this would involve.

In general the crop loss estimates as originally furnished by collaborators to the Plant Disease Survey have been computed and issued in tabular form as preliminary estimates. These have been sent back to the collaborators for their revision and suggestions. It is, of course, recognized that most of the figures are estimates in the strict sense of the word, that is, they are usually not the results of counts or calculation but of field observations.

The most serious weakness of these estimates is that many states make no reports. Computations are in all cases based on states reporting, thus where an average is given for "U. S." it should be interpreted as meaning "for the reporting area".

The basis for computation has been the production assumed to have been possible if it were not for disease. The actual production is taken to represent 100% minus the sum of the percentages of loss from all diseases of the crop in question. The possible production is obtained by dividing the actual production by 100% minus the total percentage of loss from all diseases of the crop.

$$\text{Thus: Possible production} = \frac{\text{Actual production}}{100\% - \%\text{ loss from all diseases of crop}}$$

The estimated reduction in yield from a given disease, then, is obtained by multiplying the estimated possible crop production by the estimated percentage loss from the disease.

$$\text{Thus: Estimated crop loss from given disease} = \text{Possible production} \times \%\text{ individual disease loss}$$

The percentage loss for the United States is obtained by dividing the total reduction in yield (sum of the State losses) by the possible production for the country (total actual production plus the total reduction in yield from all diseases of the crop).

The figures for the yield of various crops were taken directly from the statistics of important crops by States given in the publication, "Crops and Markets", issued by the United States Department of Agriculture. These are usually published in the December issue. The method of computation, while somewhat time-consuming, makes possible a percentage loss estimate representing the entire reporting area.

Examples are given below:

EXAMPLES

I. Loss from wheat diseases in Kansas in 1919:

Actual production for State: 151,001,000 bushels.

Total estimated percentage loss from diseases: 15.5.

Possible production: $\dfrac{151{,}001{,}000}{100\% - 15.5\% = 84.5\%}$ = 178,699,000 bushels.

Reduction in yield from all diseases:
15.5% x 178,699,000 = 27,698,000 bushels.

Estimated percentage loss from stem rust: 10.
Reduction in yield from stem rust:
10% x 178,699,000 = 17,869,900 bushels.

II. Percentage loss from stem rust and from all diseases of wheat in the United States in 1919:

Total actual production for country: 940,987,000 bushels.

Sum of calculated State losses from all diseases (total reduction in yield): 192,275,000 bushels.

Possible total production for country:
940,987,000 + 192,275,000 = 1,133,262,000 bushels.

Percentage loss from all diseases: $\dfrac{192{,}275{,}000}{1{,}133{,}262{,}000}$ = 17.

Sum of calculated State losses from stem rust: 71,417,000 bushels.

Percentage loss from stem rust: $\dfrac{71{,}417{,}000}{1{,}133{,}262{,}000}$ = 6.3.

Table 1. Estimated reduction in yield of wheat due to scab (<u>Gibberella saubinetii</u>), leaf rust (<u>Puccinia rubigo-vera tritici</u>), stem rust (<u>P. graminis</u>), bunt (<u>Tilletia</u> spp.), loose smut (<u>Ustilago tritici</u>), foot rots (various organisms), and other diseases, 1935.

State	Production 1,000 Bushels	Scab %	Scab 1,000 Bushels	Leaf Rust %	Leaf Rust 1,000 Bushels	Stem Rust %	Stem Rust 1,000 Bushels	Bunt %	Bunt 1,000 Bushels	Loose Smut %	Loose Smut 1,000 Bushels	Foot Rots %	Foot Rots 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
*Maine	160	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mass.		t	+	8.	+	12.	+	-	-	-	-	t	+	20.	+
N. Y.	6,273	-	-	6.	409	-	-	t	+	2.	136	-	-	8.	545
*N. J.	1,372	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pa.	18,960	t	+	12.	2,880	t	+	3.5	840	2.5	600	t	+	21.	5,040
Ohio	42,406	-	-	1.5	670	1.5	670	1.5	670	0.5	223	0.1	45	5.1	2,278
Ind.	28,618	2.	690	15.	5,172	-	-	t	+	t	+	-	-	17.	5,862
Ill.	26,800	0.2	63	12.5	3,932	1.	315	0.3	94	0.5	157	t	+	14.8	4,655
Mich.	17,919	t	+	t	+	0.5	94	2.5	469	1.	188	t	+	4.5	845
Wis.	2,254	2.	56	15.	419	1.5	42	0.5	14	t	+	0.1	3	19.3	540
Minn.	19,676	3.	1,789	5.	2,981	57.	33,986	1.	596	1.	596	t	+	67.	39,948
Iowa	6,118	1.5	112	10.	746	6.5	485	t	+	t	+	-	-	18.	1,343
Mo.	24,176	4.	1,131	5.	1,414	4.	1,131	t	+	1.5	424	-	-	14.5	4,100
N. D.	53,772	t	+	5.	7,908	57.	90,147	1.	1,582	1.	1,582	1.	1,582	66.	104,383
S. D.	30,822	1.	497	5.	2,486	29.	14,417	1.	497	2.	994	t	+	38.	18,391
Nebr.	39,472	-	-	-	-	15.	6,966	-	-	-	-	-	-	15.	6,966
Kans.	59,951	0	0	5.	3, 39	12.	9,453	0.3	236	0.2	158	6.	4,727	23.9	18,828
*Del.	1,658	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Md.	8,323	3.	289	2.	192	-	-	5.	481	1.5	144	-	-	13.5	1,298
Va.	8,714	1.	100	3.5	349	3.	299	t	+	3.	299	1.	100	12.5	1,247
W. Va.	2,538	1.	28	0.5	14	t	+	2.	55	2.	55	-	-	8.5	235
N. C.	5,198	2.	124	5.	309	-	-	1.	62	1.	62	2.	124	16.	990
S. C.	980	-	-	30.	445	3.	45	t	+	1.	15	-	-	34.	505
Ga.	805	-	-	20.	205	0.1	1	-	-	1.5	15	-	-	21.6	221
*Ky.	3,097	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tenn.	3,636	5.	205	5.	205	t	+	1.	41	0.5	21	-	-	11.5	472

Wheat (Continued)

State	Production 1,000 Bushels	Scab %	Scab 1,000 Bushels	Leaf Rust %	Leaf Rust 1,000 Bushels	Stem Rust %	Stem Rust 1,000 Bushels	Bunt %	Bunt 1,000 Bushels	Loose Smut %	Loose Smut 1,000 Bushels	Foot Rots %	Foot Rots 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
*Ala.	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ark.	424	-	-	10.	43	t	+	-	-	1.	5	-	-	11.	53
*Okla.	33,080	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texas	10,010	t	+	2.	237	10.	1,185	0.5	59	1.	118	1.	118	15.5	1,835
Mont.	35,017	0	0	t	+	t	+	3.	1,161	0.5	193	6.	2,322	9.5	3,676
*Idaho	20,158	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wyo.	2,385	0	0	t	+	10.	271	2.	54	-	-	-	-	12.	325
Colo.	5,952	0	0	t	+	5.	334	5.	334	1.	67	t	+	11.	735
*N.Mex.	1,036	0	0	-	-	-	-	-	-	-	-	-	-	-	-
*Ariz.	836	0	0	-	-	-	-	-	-	-	-	-	-	-	-
*Utah	5,512	0	0	-	-	-	-	-	-	-	-	-	-	-	-
*Nev.	305	0	0	-	-	-	-	-	-	-	-	-	-	-	-
*Wash.	45,577	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Oreg.	15,551	0	0	t	+	t	+	2.	328	t	+	3.	492	5.1	836
*Calif.	13,592	0	0	-	-	-	-	-	-	-	-	-	-	-	-
U. S.	603,199	0.7	5,084	5.	34,960	23.	159,841	1.1	7,573	0.9	6,052	1.4	9,513	32.6	226,652

Header: Estimated reduction in yield of wheat due to diseases.

* Omitted in calculations for U. S. percentage loss.

Table 2. Estimated reduction in yield of barley due to stripe (*Helminthosporium gramineum*), spot blotch (*Pyrenophora teres*), loose smut (*Ustilago* spp.), covered smut (*Ustilago hordei*), scab (*Gibberella saubinetii*), stem rust (*Puccinia graminis*), and other diseases, 1935.

State	Production 1,000 Bushels	Stripe %	Stripe 1,000 Bushels	Spot Blotch %	Spot Blotch 1,000 Bushels	Loose Smut %	Loose Smut 1,000 Bushels	Covered Smut %	Covered Smut 1,000 Bushels	Scab %	Scab 1,000 Bushels	Stem Rust %	Stem Rust 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
*Maine	168	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Vt.	135	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mass.		t	+	-	-	t	+	t	+	t	+	5.	+	5.	+
N. Y.	4,158	0.7	33	-	-	-	-	6.5	304	4.	187	-	-	11.2	524
*N. J.	30	-	-	-	-	-	-	t	+	-	-	-	-	-	-
Pa.	1,595	0.1	2	1.	18	3.4	62	8.4	154	t	+	t	+	12.9	236
Ohio	450	-	-	-	-	1.	5	1.	5	2.	9	t	+	4.2	20
*Ind.	572	-	-	-	-	-	-	-	-	-	-	t	+	-	-
Ill.	1,813	0.5	11	0.1	2	3.2	68	0.5	11	9.	192	0.5	11	15.2	325
Mich.	5,326	t	+	t	+	0.2	11	0.2	11	0.2	11	t	+	1.	55
Wis.	25,878	1.	283	1.5	424	3.	848	0.5	141	1.5	424	t	+	8.5	2,403
Minn.	58,752	1.	778	t	+	1.	778	1.5	1,167	6.	4,669	15.	11,673	24.5	19,065
Iowa	15,444	1.	213	0.5	107	0.5	107	0.5	107	15.	3,195	10.	2,130	27.5	5,859
Mo.	1,254	t	+	t	+	9.	136	5.	76	3.	45	t	+	17.	257
N. D.	45,558	0.2	111	t	+	0.5	277	1.	554	t	+	15.	8,303	17.7	9,799
S. D.	43,130	2.	1,065	1.	532	4.	2,130	1.	532	3.	1,597	8.	4,260	19.	10,116
Nebr.	15,686	-	-	-	-	-	-	-	-	-	-	16.	2,988	16.	2,988
Kans.	4,538	-	-	-	-	2.	103	10.	516	-	-	-	-	12.	619
Md.	759	0.5	4	-	-	1.	8	4.	33	2.	17	t	+	8.	66
Va.	936	1.5	16	1.	10	3.	31	2.	21	1.	10	t	+	9.5	98
W. Va.	81	1.	1	-	-	2.	2	3.	3	-	-	-	-	10.	10
N. C.	254	2.	6	2.	6	1.	3	1.	3	1.	3	-	-	9.	27
S. C.		t	+	-	-	-	-	-	-	-	-	-	-	-	-
Ga.		-	-	-	-	4.	+	1.	+	-	-	-	-	5.	+
*Ky.	299	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tenn.	306	1.	4	-	-	2.	8	7.	29	8.	33	-	-	25.	103
Ark.		-	-	-	-	2.	+	5.	+	-	-	-	-	7.	+

Barley (continued)

State	Production 1,000 Bushels	Stripe %	Stripe 1,000 Bushels	Spot Blotch %	Spot Blotch 1,000 Bushels	Loose Smut %	Loose Smut 1,000 Bushels	Covered Smut %	Covered Smut 1,000 Bushels	Scab %	Scab 1,000 Bushels	Stem Rust %	Stem Rust 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
		Estimated reduction in yield of barley due to diseases													
*Okla.	1,485	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texas.	2,646	0.1	3	0.1	3	1.	29	1.	29	1.	29	5.	146	9.2	268
Mont.	3,312	1.	35	0	0	1.	35	2.	69	0	0	0	0	4.	139
*Idaho	5,236	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Wyo.	1,950	1.	21	-	-	t	+	3.	64	0	0	5.	107	9.	192
Colo.	5,436	1.	55	t	+	t	+	1.	55	0	0	t	+	2.	110
*N.Mex.	264	-	-	-	-	-	-	-	-	0	0	-	-	-	-
*Ariz.	910	-	-	-	-	-	-	-	-	0	0	-	-	-	-
*Utah	1,620	-	-	-	-	-	-	-	-	0	0	-	-	-	-
*Nev.	216	-	-	-	-	-	-	-	-	0	0	-	-	-	-
*Wash.	2,108	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Oreg.	3,302	t	+	0.1	3	-	-	0.1	3	0	0	t	+	4.7	162
*Calif.	36,642	-	-	-	-	-	-	-	-	0	0	-	-	-	-
U. S.	292,249	0.9	2,641	0.4	1,105	1.6	4,641	1.3	3,887	3.5	10,421	10.	29,618	18.1	53,441

* Omitted in calculations for U. S. percentage loss.

Table 3. Estimated reduction in yield of rye due to smut (Urocystis occulta), ergot (Claviceps purpurea), leaf rust (Puccinia rubigo-vera secalis), stem rust (P. graminis), and other diseases, 1935.

State	Production: 1,000 Bushels	Smut %	Smut 1,000 Bushels	Ergot %	Ergot 1,000 Bushels	Leaf Rust %	Leaf Rust 1,000 Bushels	Stem Rust %	Stem Rust 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
Mass.		-	-	2.	+	3.	+	3.	+	8.	+
*N.Y.	345	-	-	-	-	-	-	-	-	-	-
*N.J.	315	-	-	-	-	-	-	-	-	-	-
Pa.	1,665	t	+	t	+	8.	153	t	+	13.	249
Ohio	1,320	-	-	0.1	1	1.	13	t	+	2.1	27
Ind.	2,358	-	-	-	-	15.	416	-	-	15.	416
Ill.	1,274	t	+	t	+	1.	13	t	+	1.5	19
Mich.	2,940	t	+	0.1	3	t	+	t	+	0.5	15
Wis.	4,082	t	+	t	+	0.5	21	t	+	0.7	29
Minn.	9,900	t	+	t	+	0	0	0	0	t	+
Iowa	2,077	-	-	1.	21	t	+	t	+	1.	21
*Mo.	600	-	-	-	-	-	-	-	-	-	-
N.D.	12,754	t	+	0.5	64	t	+	t	+	1.	128
S.D.	7,050	0	0	t	+	2.	144	t	+	2.	144
*Nebr.	7,250	-	-	-	-	-	-	-	-	-	-
*Kans.	682	-	-	-	-	-	-	-	-	-	-
*Del.	72	-	-	-	-	-	-	-	-	-	-
*Md.	240	-	-	-	-	-	-	-	-	-	-
Va.	540	-	-	t	+	2.5	14	t	+	2.5	14
W.Va.	150	t	+	t	+	0.5	1	-	-	0.5	1
N.C.	458	-	-	-	-	t	+	-	-	4.	19
*S.C.	72	-	-	-	-	-	-	-	-	-	-
Ga.	95	-	-	-	-	0.1	+	-	-	0.1	+
*Ky.	106	-	-	-	-	-	-	-	-	-	-
Tenn.	109	t	+	t	+	2.	2	-	-	12.	14
*Okla.	64	-	-	-	-	-	-	-	-	-	-
Texas	36	t	+	0	0	1.	+	t	+	2.	+
Mont.	620	0	0	t	+	0	0	0	0	t	+
*Idaho	50	-	-	-	-	-	-	-	-	-	-
Wyo.	144	-	-	-	-	-	-	t	+	t	+
Colo.	126	0	0	t	+	t	+	0	0	t	+
*Utah	45	-	-	-	-	-	-	-	-	-	-
*Wash.	98	-	-	-	-	-	-	-	-	-	-
Oreg.	299	0	0	t	+	t	+	t	+	0.1	+
U. S.	57,936	t	+	0.2	89	1.6	777	t	+	2.2	1,096

* Omitted in calculations for U. S. percentage loss.

Table 4. Estimated reduction in yield of oats due to smuts (*Ustilago avenae* and *U. levis*), stem rust (*Puccinia graminis*), crown rust (*P. coronata*), and other diseases, 1935.

State	Production	Estimated reduction in yield of oats due to diseases							
		Smuts		Stem rust		Crown Rust		All Diseases	
	1,000 Bushels	%	1,000 Bushels	%	1,000 Bushels	%	1,000 Bushels	%	1,000 Bushels
*Maine	3,996	-	-	-	-	-	-	-	-
*N. H.	351	-	-	-	-	-	-	-	-
*Vt.	1,876	-	-	-	-	-	-	-	-
Mass.	160	10.	18	3.	6	t	+	13.	24
*R. I.	68	-	-	-	-	-	-	-	-
*Conn.	330	-	-	-	-	-	-	-	-
N. Y.	25,742	9.5	2,827	-	-	4.	1,190	13.5	4,017
*N. J.	1,440	-	-	-	-	-	-	-	-
Pa.	26,013	15.	4,788	t	+	0.5	160	18.5	5,906
Ohio	45,684	5.	2,420	t	+	0.5	242	5.6	2,710
Ind.	38,610	1.	489	t	+	20.	9,775	21.	10,264
Ill.	107,716	2.6	3,449	t	+	5.	6,633	18.8	24,939
Mich.	43,818	1.5	671	t	+	t	+	1.7	894
Wis.	85,702	4.	3,896	t	+	8.	7,791	12.	11,687
Minn.	181,189	3.	5,723	1.	1,907	1.	1,907	5.	9,537
Iowa	205,137	1.	2,849	1.	2,849	20.	56,983	28.	79,776
Mo.	30,888	7.	2,637	1.	377	10.	3,767	18.	6,781
N. D.	54,575	1.	620	5.	3,101	5.	3,101	12.	7,442
S. D.	67,260	2.	1,401	t	+	2.	1,401	4.	2,802
*Nebr.	75,980	-	-	-	-	-	-	-	-
Kans.	41,022	4.	1,823	2.	912	4.	1,823	10.	4,558
*Del.	99	-	-	-	-	-	-	-	-
Md.	1,372	6.	89	t	+	2.	30	8.	119
Va.	2,442	3.5	91	1.5	39	1.	26	6.	156
W. Va.	2,044	5.	111	t	+	1.	22	8.	177
N. C.	4,730	1.	51	-	-	3.	153	7.	357
S. C.	9,768	10.	116	1.0	12	5.	58	16.	186
Ga.	7,298	2.	150	-	-	1.	75	3.	225
*Fla.	112	-	-	-	-	-	-	-	-
*Ky.	1,496	-	-	-	-	-	-	-	-
Tenn.	1,147	10.	135	-	-	5.	67	15.	202
*Ala.	1,881	-	-	-	-	-	-	-	-
*Miss.	600	-	-	-	-	-	-	-	-
Ark.	2,244	2.	95	0.8	38	50.	2,377	52.8	2,510
*La.	650	-	-	-	-	-	-	-	-
*Okla.	37,895	-	-	-	-	-	-	-	-
Texas	39,123	5.	2,386	10.	4,771	2.	954	18.	8,588
Mont.	8,272	5.	450	0	0	0	0	8.	720
*Idaho	5,168	-	-	-	-	-	-	-	-
Wyo.	3,562	6.	227	t	+	-	-	6.	227
Colo.	3,406	t	+	t	+	-	-	t	+
*N. Mex.	1,085	-	-	-	-	-	-	-	-
*Ariz.	378	-	-	-	-	-	-	-	-
*Utah	2,072	-	-	-	-	-	-	-	-
*Nev.	76	-	-	-	-	-	-	-	-
*Wash.	9,408	-	-	-	-	-	-	-	-
Oreg.	7,590	0.2	16	t	+	t	+	2.9	227
*Calif.	3,960	-	-	-	-	-	-	-	-
U. S.	1,195,435	3.	37,528	1.1	14,012	8.	98,535	14.9	185,031

* Omitted in calculations for U. S. percentage loss.

Table 5. Estimated reduction in yield of field corn due to smut (Ustilago zeae), root rots (various organisms), ear rots and stalk rots (various organisms other than Diplodia), ear and stalk rots (Diplodia zeae), bacterial wilt (Aplanobacter stewarti), and other diseases, 1935.

State	Production 1,000 Bushels	Smut %	Smut 1,000 Bushels	Root Rots %	Root Rots 1,000 Bushels	Ear Rots (except Diplodia) %	Ear Rots (except Diplodia) 1,000 Bushels	Stalk Rots (except Diplodia) %	Stalk Rots (except Diplodia) 1,000 Bushels	Diplodia %	Diplodia 1,000 Bushels	Bacterial Wilt %	Bacterial Wilt 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
*Maine	520	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*N. H.	697	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Vt.	2,880	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mass.	1,599	4.	77	2.	39	t	+	t	+	1.	19	t	+	17.	328
*R. I.	369	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Conn.	2,160	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*N. Y.	22,032	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*N. J.	8,190	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pa.	58,742	6.	4,461	t	+	10.	7,436	5.	3,718	t	+	t	+	21.	15,615
Ohio	133,980	8.	12,320	1.	1,540	2.	3,080	-	-	2.	3,080	-	-	13.	20,020
Ind.	153,444	1.	1,612	1.	1,612	1.	1,612	-	-	0.8	1,289	t	+	4.8	7,737
Ill.	288,382	2.3	8,417	4.	14,638	4.8	17,566	3.	10,797	1.1	4,025	t	+	21.2	77,583
Mich.	51,660	3.5	1,835	0.3	162	t	+	t	+	0.3	162	t	+	4.1	2,209
Wis.	78,608	1.5	1,317	t	+	4.	3,513	5.	4,392	t	+	t	+	10.5	9,222
Minn.	148,731	4.	6,363	2.	3,181	0.5	795	-	-	-	-	-	-	6.5	10,339
Iowa	352,425	2.	7,832	-	-	4.	15,663	-	-	4.	15,663	-	-	10.	39,158
Mo.	73,701	0.5	374	-	-	1.	748	t	+	t	+	-	-	1.5	1,122
N. D.	21,690	2.5	571	1.	228	0.5	114	1.	228	-	-	-	-	5.	1,141
S. D.	52,248	5.	2,779	-	-	1.	556	-	-	-	-	-	-	6.	3,335
*Nebr.	105,570	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kans.	34,560	1.	368	-	-	1.	368	2.	735	-	-	t	+	4.	1,471
*Del.	4,464	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Md.	18,935	0.5	104	5.	1,040	3.	624	-	-	0.5	104	t	+	9.	1,872
Va.	39,384	1.5	654	2.5	1,090	1.5	654	1.	436	-	-	2.	872	8.5	3,706
W. Va.	13,216	4.	622	3.	466	5.	777	1.	155	0.5	78	t	+	15.	2,331

Field Corn (Continued)

State	Production 1,000 Bushels	Smut %	Smut 1,000 Bushels	Root Rots %	Root Rots 1,000 Bushels	Ear Rots (except Diplodia) %	Ear Rots (except Diplodia) 1,000 Bushels	Stalk Rots (except Diplodia) %	Stalk Rots (except Diplodia) 1,000 Bushels	Diplodia %	Diplodia 1,000 Bushels	Bacterial Wilt %	Bacterial Wilt 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
N. C.	49,780	5.	2,928	1.	586	2.	1,171	2.	1,171	t	+	-	-	15.	8,784
S. C.	25,592	0.5	148	10.	2,959	3.	888	-	-	t	+	-	-	13.5	3,995
Ga.	44,495	4.	1,854	-	-	-	-	-	-	-	-	-	-	4.	1,854
*Fla.	6,374	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Ky.	59,018	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tenn.	51,760	2.	1,176	5.	2,941	3.	1,765	-	-	2.	1,176	-	-	12.	7,058
*Ala.	44,761	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Miss.	36,356	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ark.	26,000	1.	263	-	-	-	-	-	-	-	-	-	-	1.	263
*La.	23,922	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Okla.	31,158	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texas	105,358	1.	1,158	2.	2,316	t	+	1.	1,158	1.	1,158	2.	2,316	9.	10,422
*Mont.	1,300	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Idaho	1,558	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Wyo.	2,519	t	+	-	-	-	-	-	-	-	-	-	-	t	+
Colo.	12,464	1.	126	0	0	0	0	0	0	0	0	0	0	1.	126
*N. Mex.	3,848	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Ariz.	720	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Utah	506	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Nev.	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Wash.	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oreg.	1,888	0.1	2	t	+	0	0	0	0	0	0	0	0	0.1	2
*Calif.	3,040	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U. S.	2,292,852	2.8	57,411	1.6	32,798	2.8	57,332	1.1	22,972	1.3	26,754	0.2	3,188	11.2	229,693

* Omitted in calculations for U. S. percentage loss.

Table 6. Sweet corn for manufacture; estimated reduction in yield of sweet corn due to smut (*Ustilago zeae*), bacterial wilt (*Aplanobacter stewarti*), stalk and ear rots (*Diplodia zeae*), and other diseases, 1935.

State	Production Short Tons	Estimated reduction in yield due to diseases							
		Smut		Bacterial Wilt		Diplodia		All Diseases	
		%	Short Tons	%	Short Tons	%	Short Tons	%	Short Tons
*Maine	50,000	-	-	-	-	-	-	-	-
*N. H.	2,700	-	-	-	-	-	-	-	-
*Vt.	3,100	-	-	-	-	-	-	-	-
Mass.		8.	+	t	+	2.	+	22.	+
Conn.		-	-	t	+	-	-	t	+
N. Y.	50,400	5.	2,653	-	-	-	-	5.	2,653
Pa.	10,200	7.	992	15.	2,125	5.	708	28.	3,967
*Ohio	55,400	-	-	-	-	-	-	-	-
Ind.	84,500	5.	5,030	5.	5,030	6.	6,036	16.	16,096
*Ill.	198,000	-	-	-	-	-	-	-	-
Mich.	7,200	5.	380	t	+	t	+	5.2	395
Wis.	38,000	7.	3,075	t	+	6.5	2,855	13.5	5,930
Minn.	151,800	4.	6,494	-	-	0.5	812	6.5	10,553
Iowa	105,600	5.	5,677	-	-	2.	2,271	7.	7,948
S. D.		6.	+	-	-	-	-	6.	+
*Nebr.	4,500	-	-	-	-	-	-	-	-
*Del.	7,300	-	-	-	-	-	-	-	-
Md.	60,500	1.	676	1.5	1,014	-	-	10.5	7,098
Va.		1.	+	2.5	+	0.5	+	4.	+
W. Va.		3.	+	5.	+	1.	+	12.	+
Tenn.	7,100	2.	145	-	-	-	-	2.	145
Oreg.		0	0	0	0	0	0	0.1	+
**Other States	18,300	-	-	-	-	-	-	-	-
U. S.	854,600	4.4	25,122	1.4	8,169	2.2	12,682	9.6	54,785

* Omitted in calculations for U. S. percentage loss.

** Includes Colorado, Idaho, Kansas, Kentucky, Missouri, Montana, Oklahoma, Oregon, South Dakota, Virginia, Washington and Wyoming.

Table 7. Estimated reduction in yield of sweet potato due to stem rot (Fusarium spp.), black rot (Ceratostomella fimbriata), and other diseases, and estimated loss from storage rots (various organisms), 1935.

State	Production: 1,000 Bushels	Stem Rot %	Stem Rot 1,000 Bushels	Black Rot %	Black Rot 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels	Storage Rots %	Storage Rots 1,000 Bushels
Conn.		-	-	-	-	1.	+	-	-
*N. J.	2,100	-	-	-	-	-	-	-	-
Pa.		t	+	t	+	1.	+	2.	+
Ind.	392	3.	12	1.	4	4.	16	-	-
*Ill.	600	-	-	-	-	-	-	-	-
Iowa	285	4.	13	5.	16	9.	29	15.	50
*Mo.	900	-	-	-	-	-	-	-	-
Kans.	350	5.	19	t	+	6.	23	4.	15
*Del.	840	-	-	-	-	-	-	-	-
Md.	840	2.	18	2.5	23	8.	73	7.	63
Va.	4,060	7.	306	t	+	7.	306	15.	716
N. C.	8,000	8.	719	1.	90	11.	989	20.	2,000
S. C.	5,192	t	+	5.	288	10.	576	15.	916
*Ga.	8,010	-	-	-	-	-	-	-	-
*Fla.	1,870	-	-	-	-	-	-	-	-
*Ky.	1,760	-	-	-	-	-	-	-	-
Tenn.	4,720	4.	207	5.	259	9.	466	10.	524
*Ala.	6,900	-	-	-	-	-	-	-	-
*Miss.	5,883	-	-	-	-	-	-	-	-
Ark.	1,820	2.	38	2.	38	4.	76	10.	202
*La.	6,512	-	-	-	-	-	-	-	-
*Okla.	1,030	-	-	-	-	-	-	-	-
Texas	6,390	0.1	8	10.	800	20.1	1,608	15.	1,128
*Calif.	1,344	-	-	-	-	-	-	-	-
U. S.	69,853	2.7	1,340	3.1	1,518	8.5	4,162	11.1	5,614

* Omitted in calculations for U. S. percentage loss.

Table 8. Estimated reduction in yield of potato due to mosaic (virus), leaf roll (virus), late blight (*Phytophthora infestans*), Rhizoctonia (*Corticium vagum*).

State	Production: 1,000 Bushels	Estimated reduction in yield due to diseases							
		Mosaic		Leaf Roll		Late Blight		Rhizoctonia	
		%	1,000 Bushels	%	1,000 Bushels	%	1,000 Bushels	%	1,000 Bushels
Maine	38,640	5.	2,760	3.	1,656	8.	4,416	8.	4,416
*N. H.	1,200	-	-	-	-	-	-	-	-
Vt.	1,840	3.	69	3.	69	6.	138	5.	115
Mass.	1,760	3.	72	3.	72	3.	72	8.	193
*R. I.	735	-	-	-	-	-	-	-	-
Conn.	1,980	1.	21	-	-	0.5	10	0.5	10
N. Y.	21,450	-	-	3.	870	5.	1,449	5.	1,449
*N. J.	9,750	-	-	-	-	-	-	-	-
Pa.	22,572	3.	989	8.	2,636	8.	2,636	3.	989
Ohio	12,826	0.5	80	5.	802	t	+	3.	481
*Ind.	5,280	-	-	-	-	-	-	-	-
*Ill	4,050	-	-	-	-	-	-	-	-
Mich.	24,985	0.2	56	1.	279	t	+	1.	279
Wis.	20,746	t	+	0	0	0	0	t	+
Minn.	28,390	5.	1,918	-	-	0	0	4.	1,535
Iowa	6,300	12.	1,096	5.	457	0	0	3.	274
*Mo.	4,212	-	-	-	-	-	-	-	-
N. D.	13,500	1.	145	1.	145	-	-	1.5	217
S. D.	3,400	1.	41	0.2	8	0	0	5.	204
*Nebr.	8,694	-	-	-	-	-	-	-	-
Kans.	2,625	t	+	-	-	t	+	10.	328
*Del.	500	-	-	-	-	-	-	-	-
Md.	3,135	2.	80	2.5	100	5.	201	3.	121
Va.	11,352	2.	307	2.	307	0	0	1.	153
W. Va.	2,924	3.	135	10.	450	3.	135	5.	225
N. C.	9,130	1.	111	4.	445	1.	111	2.	223
S. C.	1,926	t	+	-	-	-	-	3.	61
Ga.	1,365	3.	52	0.1	2	0.1	2	1.	17
Fla.	2,288	1.	27	-	-	t	+	4.	106
*Ky.	5,762	-	-	-	-	-	-	-	-
Tenn.	4,446	2.	102	t	+	-	-	1.	51
*Ala.	3,230	-	-	-	-	-	-	-	-
*Miss.	1,136	-	-	-	-	-	-	-	-
*Ark.	3,476	-	-	-	-	-	-	-	-
*La.	2,856	-	-	-	-	-	-	-	-
*Okla.	2,840	-	-	-	-	-	-	-	-
Texas	3,240	2.	76	0.1	4	t	+	2.	76
Mont.	1,955	5.	114	t	+	0	0	3.	68
*Idaho	17,800	-	-	-	-	-	-	-	-
Wyo.	2,430	5.	150	-	-	-	-	3.	90
Colo.	15,120	t	+	t	+	0	0	1.	156
*N. Mex.	490	-	-	-	-	-	-	-	-
*Ariz.	150	-	-	-	-	-	-	-	-
*Utah	2,040	-	-	-	-	-	-	-	-
*Nev.	450	-	-	-	-	-	-	-	-
*Wash.	6,270	-	-	-	-	-	-	-	-
Oreg.	4,810	10.	697	4.	279	-	-	5.	349
*Calif.	10,350	-	-	-	-	-	-	-	-
U. S.	356,406	2.6	9,098	2.5	8,581	2.6	9,170	3.5	12,186

Potato - (Continued). Blackleg, (Bacillus phytophthorus), Fusarium wilt (Fusarium spp.), tipburn and hopperburn (non-parasitic and leaf hopper), early blight (Alternaria solani), scab (Actinomyces scabies), and other diseases, 1935.

State	Estimated reduction in yield due to diseases											
	Blackleg		Fusarium Wilt		Tipburn and Hopperburn		Early Blight		Scab		All Diseases	
	%	1,000 Bushels	%	1,000 Bushels	%	1,000 Bushels	%	1,000 Bushels	%	1,000 Bushels	%	1,000 Bushels
Maine	2.	1,104	0	0	-	-	0	0	4.	2,208	30.	16,560
N.H.	t	+	-	-	-	-	-	-	-	-	-	-
Vt.	t	+	-	-	3.	69	-	-	-	-	20.	460
Mass.	t	+	t	+	4.	96	3.	72	1.	24	27.	649
R.I.	-	-	-	-	-	-	-	-	-	-	-	-
Conn.	0.5	10	-	-	2.	43	t	+	0.5	10	5.	104
N.Y.	t	+	-	-	10.	2,899	t	+	3.	870	26.	7,537
N.J.	-	-	-	-	-	-	-	-	-	-	-	-
Pa.	t	+	2.	659	2.	659	t	+	0.5	165	31.5	10,381
Ohio	2.	321	1.	160	5.	802	2.	321	0.5	80	20.	3,207
Ind.	-	-	-	-	-	-	-	-	-	-	-	-
Ill.	-	-	-	-	-	-	-	-	-	-	-	-
Mich.	1.5	418	1.	279	3.5	975	0.3	84	1.5	418	10.3	2,872
Wis.	0.5	124	t	+	5.	1,242	5.	1,242	5.	1,242	16.5	4,098
Minn.	1.	384	4.	1,535	5.	1,918	1.	384	1.	384	26.	9,976
Iowa	1.	91	-	-	5.	457	t	+	5.	457	31.	2,832
Mo.	-	-	-	-	-	-	-	-	-	-	-	-
N.D.	2.	289	1.	145	0.2	29	t	+	t	+	6.7	970
S.D.	0.5	20	2.	82	1.	41	0	0	2.	82	16.7	682
Nebr.	-	-	-	-	-	-	-	-	-	-	-	-
Kans.	t	+	t	+	-	-	-	-	t	+	20.	656
Del.	-	-	-	-	-	-	-	-	-	-	-	-
Md.	t	+	3.	121	1.	40	1.	40	4.	161	22.	884
Va.	1.	153	1.	153	5.	767	1.	153	3.	460	16.	2,453
W.Va.	2.	90	1.5	67	7.5	337	t	+	t	+	35.	1,574
N.C.	2.	223	1.	111	2.	223	2.	223	-	-	18.	2,004
S.C.	-	-	-	-	-	-	t	+	t	+	5.	102
Ga.	2.	35	-	-	5.	87	10.	173	-	-	21.2	368
Fla.	0.5	13	-	-	-	-	t	+	0.5	13	14.	372
Ky.	-	-	-	-	-	-	-	-	-	-	-	-
Tenn.	-	-	-	-	5.	254	4.	203	0.5	25	12.5	635
Ala.	-	-	-	-	-	-	-	-	-	-	-	-
Miss.	-	-	-	-	-	-	-	-	-	-	-	-
Ark.	-	-	-	-	-	-	-	-	-	-	-	-
La.	-	-	-	-	-	-	-	-	-	-	-	-
Okla.	-	-	-	-	-	-	-	-	-	-	-	-
Texas	0.1	4	1.	38	0.5	19	1.	38	5.	190	14.7	559
Mont.	t	+	2.	45	t	+	t	+	2.	45	14.	317
Idaho	-	-	-	-	-	-	-	-	-	-	-	-
Wyo.	2.	60	5.	150	-	-	t	+	2.	60	19.	570
Colo.	0	0	2.	312	0	0	t	+	t	+	3.	468
N.M.	-	-	-	-	-	-	-	-	-	-	-	-
Ariz.	-	-	-	-	-	-	-	-	-	-	-	-
Utah	-	-	-	-	-	-	-	-	-	-	-	-
Nev.	-	-	-	-	-	-	-	-	-	-	-	-
Wash.	-	-	-	-	-	-	-	-	-	-	-	-
Oreg.	3.	209	2.	139	3.	209	-	-	4.	279	31.	2,161
Calif.	-	-	-	-	-	-	-	-	-	-	-	-
U. S.	1.	3,548	1.1	3,996	3.2	11,166	0.8	2,933	2.1	7,173	21.	73,451

Table 9. Tomatoes for manufacture; estimated reduction in yield due to blight (*Septoria lycopersici*), Fusarium wilt (*Fusarium lycopersici*), early blight (*Alternaria solani*), nailhead spot (*Macrosporium tomato*), blossom-end rot (non-parasitic), curly-top (virus), and other diseases, 1935.

State	Production Short Tons°	Septoria Blight %	Septoria Blight Short Tons	Fusarium Wilt %	Fusarium Wilt Short Tons	Bacterial Wilt %	Bacterial Wilt Short Tons	Early Blight %	Early Blight Short Tons	Nailhead Spot %	Nailhead Spot Short Tons	Blossom-end Rot %	Blossom-end Rot Short Tons	Curly-top %	Curly-top Short Tons	All Diseases %	All Diseases Short Tons
Mass.		0.5	+	t	+	1.	+	7.	+	-	-	2.	+	0	0	16.5	+
Conn.		t	+	-	-	-	-	1.	+	-	-	0.5	+	0	0	5.5	+
*N.Y.	127,000	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
*N.J.	155,000	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
Pa.	54,200	4.	2,891	1.	723	-	-	2.	1,445	-	-	10.	7,227	0	0	25.	18,067
Ohio	81,600	4.	4,352	2.	2,176	0.5	544	15.	16,320	0.5	544	1.	1,088	0	0	25.	27,200
Ind.	350,300	-	-	1.	371	-	-	4.5	1,668	-	-	-	-	0	0	5.5	2,039
Ill.	30,700	15.	10,709	5.	3,570	t	+	-	-	1.	714	1.	714	0	0	57.	40,695
Mich.	17,600	1.	207	1.	207	0	0	t	+	-	-	t	+	0	0	15.	3,106
Wis.		5.	+	t	+	t	+	15.	+	t	+	t	+	0	0	20.	+
Minn.		t	+	0	0	0	0	t	+	0	0	4.	+	0	0	5.	+
Iowa	11,200	3.	373	-	-	-	-	4.	498	0	0	1.	124	0	0	10.	1,244
*Mo.	18,000	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
N.D.		t	+	t	+	t	+	t	+	-	-	1.	+	0	0	2.	+
Kans.		0	0	0	0	-	-	-	-	-	-	-	-	0	0	-	-
*Del.	49,000	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
Md.	225,000	0.5	1,669	0.5	1,669	-	-	8.	26,706	-	-	0.2	668	0	0	32.6	108,828
Va.	82,500	3.	5,357	10.	17,857	2.	3,571	10.	17,857	-	-	t	+	0	0	30.	53,571
W.Va.		1.5	+	3.	+	-	-	t	+	0.5	+	2.	+	0	0	12.	+
N.C.		2.	+	8.	+	5.	+	2.	+	-	-	5.	+	0	0	30.	+
Ga.		1.	+	5.	+	1.	+	0.1	+	-	-	10.	-	0	0	17.1	+
Fla.		-	-	3.	+	-	-	-	-	t	+	-	-	0	0	5.	+
*Ky.	14,000	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
Tenn.	21,800	8.	2,725	10.	3,406	-	-	12.	4,088	1.	341	5.	1,703	0	0	36.	12,263
*Ark.	21,000	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
Texas		1.	+	3.	+	0.1	+	0.1	+	0	0	4.	+	0	0	18.2	+

Tomatoes (Continued)

State	Production Short Tons°	Septoria Blight %	Septoria Blight Short Tons	Fusarium Wilt %	Fusarium Wilt Short Tons	Bacterial Wilt %	Bacterial Wilt Short Tons	Early Blight %	Early Blight Short Tons	Nailhead Spot %	Nailhead Spot Short Tons	Blossom-end Rot %	Blossom-end Rot Short Tons	Curly-top %	Curly-top Short Tons	All Diseases %	All Diseases Short Tons
Mont.		0	0	t	+	0	0	0	0	0	0	t	+	2.	+	5.	+
Idaho		0	0	-	-	0	0	0	0	-	-	-	-	35.	+	35.	+
Colo.	17,000	0	0	t	+	0	0	0	0	-	-	t	+	1.	172	1.	172
Utah	32,800	0	0	t	+	0	0	0	0	-	-	-	-	47.	33,153	53.5	37,738
Oreg.		0	0	-	-	0	0	0	0	2.	+	8.	+	40.	+	85.	+
Calif.	283,200	0	0	-	-	0	0	0	0	-	-	-	-	-	-	-	-
**Other States	81,500																
U. S.	1,673,400	1.9	28,283	2.	29,979	0.3	4,115	4.5	68,582	0.1	1,599	0.8	11,524	2.2	33,325	20.2	304,923

° Short tons, 2,000 lbs.

* Omitted in calculations for U. S. percentage loss.

** Includes Connecticut, Florida, Georgia, Idaho, Kansas, Louisiana, Minnesota, Mississippi, Nebraska, New Mexico, North Carolina, Oklahoma, Oregon, South Carolina, Texas, Washington, West Virginia, and Wisconsin.

Table 10. Tomatoes for market; estimated reduction in yield due to blight (Septoria lycopersici), Fusarium wilt (Fusarium lycopersici), early blight (Alternaria solani), nailhead spot (Macrosporium tomato), blossom-end rot (non-parasitic), curly-top (virus), and other diseases, 1935.

State	Production 1,000 °Bushels	Septoria Blight %	Septoria Blight 1,000 Bushels	Fusarium Wilt %	Fusarium Wilt 1,000 Bushels	Bacterial Wilt %	Bacterial Wilt 1,000 Bushels	Early Blight %	Early Blight 1,000 Bushels	Nailhead Spot %	Nailhead Spot 1,000 Bushels	Blossom-end Rot %	Blossom-end Rot 1,000 Bushels	Curly-top %	Curly-top 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
Mass.		0.5	+	t	+	1.	+	7.	+	-	-	2.	+	0	0	16.5	+
Conn.		t	+	-	-	-	-	1.	+	-	-	0.5	+	0	0	5.5	+
*N.Y.	1,494	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
*N.J.	2,000	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
Pa.	128	4.	7	1.	2	-	-	2.	3	-	-	10.	17	0	0	25.	43
Ohio	541	4.	29	2.	14	0.5	4	15.	108	0.5	4	1.	7	0	0	25.	180
Ind.	580	-	-	1.	6	-	-	4.5	28	-	-	-	-	0	0	5.5	34
Ill.	247	15.	86	5.	29	t	+	-	-	1.	6	1.	6	0	0	57.	328
Mich.	420	1.	5	1.	5	0	0	t	+	-	-	t	+	0	0	15.	74
Wis.		0.5	+	t	+	t	+	15.	+	t	+	t	+	0	0	15.5	+
Minn.		t	+	0	0	0	0	t	+	0	0	4.	+	0	0	5.	+
Iowa	54	3.	2	-	-	-	-	4.	2	0	0	1.	1	0	0	10.	6
*Mo.	768	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
N.D.		t	+	t	+	t	+	t	+	-	-	1.	+	0	0	2.	+
Kans.		0	0	0	0	-	-	-	-	-	-	-	-	0	0	0	0
*Del.	29	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
Md.	585	0.5	4	0.5	4	-	-	8.	69	-	-	0.2	2	0	0	32.6	282
Va.	450	2.	13	10.	63	2.	13	10.	63	-	-	t	+	0	0	29.	184
W.Va.		1.5	+	3.	+	-	-	t	+	0.5	+	2.	+	0	0	12.	+
N.C.	72	2.	2	8.	8	5.	5	2.	2	-	-	5.	5	0	0	30.	30
S.C.	272	t	+	5.	18	t	+	15.	54	-	-	5.	18	0	0	25.	90
Ga.	96	1.	1	5.	6	1.	1	0.1	+	-	-	10.	12	0	0	17.1	20
Fla.	2,709	-	-	3.	86	-	-	-	-	t	+	-	-	0	0	5.	143
*Ky.	240	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
Tenn.	886	8.	111	10.	138	-	-	12.	166	1.	14	5.	69	0	0	36.	498
*Miss.	1,024	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-

Tomatoes (Continued)

State	Produc-tion 1,000 °Bushels	Septoria Blight %	Septoria Blight 1,000 Bushels	Fusarium Wilt %	Fusarium Wilt 1,000 Bushels	Bacterial Wilt %	Bacterial Wilt 1,000 Bushels	Early Blight %	Early Blight 1,000 Bushels	Nailhead Spot %	Nailhead Spot 1,000 Bushels	Blossom-end Rot %	Blossom-end Rot 1,000 Bushels	Curly-top %	Curly-top 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
*Ark.	240	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
*La.	114	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-	-
Texas	2,298	1.	28	3.	84	0.1	3	0.1	3	0	0	4.	112	0	0	18.2	511
Mont.		0	0	t	+	0	0	0	0	0	0	t	+	2.	+	5.	+
Idaho		0	0	-	-	0	0	0	0	-	-	-	-	35.	+	35.	+
Colo.	451	0	0	t	+	0	0	0	0	0	0	t	+	1.	5	2.	10
Utah	94	0	0	t	+	0	0	0	0	0	0	-	-	47.	95	53.5	108
*Wash.	270	0	0	-	-	0	0	0	0	-	-	-	-	-	-	-	-
Oreg.	175	0	0	-	-	0	0	0	0	2.	23	8.	93	40.	467	85.	991
*Calif.	2,666	0	0	-	-	0	0	0	0	-	-	-	-	-	-	-	-
U. S.	18,903	2.1	288	3.4	463	0.2	26	3.7	498	0.3	47	2.5	342	4.2	567	26.	3,532

°Bushels of 53 lbs.

*Omitted in calculations for U. S. percentage loss.

Table 11. Snap beans for manufacture; estimated reduction in yield due to Anthracnose (Colletotrichum lindemuthianum), bacterial blights (Bacterium spp.), mosaic (virus), root rots (various organisms), rust (Uromyces phaseoli typica), and other diseases, 1935.

State	Production Short Tons	Anthracnose %	Anthracnose Short Tons	Bacterial Blights %	Bacterial Blights Short Tons	Mosaic %	Mosaic Short Tons	Root Rots %	Root Rots Short Tons	Rust %	Rust Short Tons	All Diseases %	All Diseases Short Tons
*Maine	2,700	-	-	-	-	-	-	-	-	-	-	-	-
Mass.		t	+	3.	+	3.	+	10.	+	t	+	16.	+
*N.Y.	12,600	-	-	-	-	-	-	-	-	t	+	-	-
Pa.	1,800	6.	126	1.	21	0.5	11	6.	126	t	+	14.5	305
Ohio		0.5	+	2.	+	0.5	+	1.	+	-	-	5.	+
*Ind.	3,800	-	-	-	-	-	-	-	-	-	-	-	-
Ill.		1.	+	2.	+	25.	+	-	-	-	-	30.	+
Mich.	8,000	t	+	2.5	212	t	+	0.5	43	t	+	5.8	492
Wis.	10,100	0	0	t	+	5.	532	t	+	0	0	5.	532
Minn.		t	+	3.	+	2.	+	t	+	0	0	6.	+
N.D.		t	+	0.5	+	2.	+	t	+	t	+	2.5	+
*Del.	1,400	-	-	-	-	-	-	-	-	-	-	-	-
Md.	13,300	t	+	1.5	209	0.2	28	3.	419	-	-	4.7	656
Va.		t	+	5.	+	4.	+	2.	+	t	+	36.	+
W.Va.		3.	+	3.	+	1.	+	2.	+	0.5	+	11.	+
N.C.		-	-	1.	+	2.	+	7.	+	-	-	18.	+
S.C.	200	0	0	t	+	t	+	5.	11	t	+	5.	11
Ga.		0.1	+	1.	+	-	-	-	-	1.	+	2.1	+
Tenn.	1,700	-	-	1.	18	2.	35	-	-	1.	18	4.	71
*Miss.	1,200	-	-	-	-	-	-	-	-	-	-	-	-
*Ark.	1,500	-	-	-	-	-	-	-	-	-	-	-	-
*La.	600	-	-	-	-	-	-	-	-	-	-	-	-
Texas		t	+	5.	+	1.	+	5.	+	t	+	13.	+
Mont.		0	0	2.	+	5.	+	1.	+	t	+	8.	+
Wyo.		0	0	6.5	+	6.	+	5.	+	-	-	17.5	+
Colo.	2,900	0	0	1.5	47	3.	93	2.	62	0	0	6.5	202
*Utah	1,900	0	0	-	-	-	-	-	-	-	-	-	-
*Wash.	2,000	0	0	-	-	-	-	-	-	-	-	-	-
Oreg.	6,200	0	0	-	-	5.	344	-	-	-	-	10.	688
*Calif	2,800	0	0	-	-	-	-	-	-	-	-	-	-
**Other States	5,500												
U. S.	80,200	0.3	126	1.1	507	2.2	1,043	1.4	661	+	18	6.2	2,957

* Omitted in calculations for U. S. percentage loss.

** Includes Alabama, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, North Carolina, Ohio, Oklahoma, Texas, Vermont, Virginia, West Virginia, Wyoming.

Table 12. Snap beans for market; estimated reduction in yield due to Anthracnose (Colletotrichum lindemuthianum), bacterial blights (Bacterium spp.), mosaic (virus), root rots (various organisms), rust (Uromyces phaseoli typica), and other diseases, 1935.

State	Production 1,000 °Bushels	Anthracnose %	Anthracnose 1,000 Bushels	Bacterial Blights %	Bacterial Blights 1,000 Bushels	Mosaic %	Mosaic 1,000 Bushels	Root Rots %	Root Rots 1,000 Bushels	Rust %	Rust 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
Mass.		t	+	3.	+	3.	+	10.	+	t	+	16.	+
Conn.		-	-	-	-	-	-	-	-	-	-	2.	+
*N.Y.	242	-	-	-	-	-	-	-	-	t	+	-	-
*N.J.	1,189	-	-	-	-	-	-	-	-	-	-	-	-
Pa.	414	6.	29	1.	5	0.5	+	6.	29	t	+	14.5	68
Ohio		0.5	+	2.	+	0.5	+	1.	+	-	-	5.	+
Ill.	32	1.	1	2.	1	25.	11	-	-	-	-	30.	14
Mich.	68	t	+	2.5	2	t	+	0.5	+	t	+	5.8	4
Wis.		0	0	t	+	5.	+	t	+	0	0	5.	+
Minn.		t	+	3.	+	2.	+	t	+	0	0	6.	+
N.D.		t	+	0.5	+	2.	+	t	+	t	+	2.5	+
*Del.	8	-	-	-	-	-	-	-	-	-	-	-	-
Md.	208	t	+	1.5	3	0.2	+	3.	7	-	-	4.7	10
Va.	331	0	0	5.	25	2.	10	2.	10	t	+	34.	170
W.Va.		3.	+	3.	+	1.	+	2.	+	0.5	+	11.	+
N.C.	664	-	-	1.	8	2.	16	7.	55	-	-	18.	142
S.C.	318	0	0	t	+	t	+	5.	17	t	+	5.	17
Ga.	288	0.1	+	1.	3	-	-	-	-	1.	3	2.1	6
*Fla.	5,069	-	-	-	-	-	-	-	-	-	-	-	-
Tenn.	81	-	-	1.	1	2.	2	-	-	1.	1	4.	4
*Ala.	64	-	-	-	-	-	-	-	-	-	-	-	-
*Miss.	299	-	-	-	-	-	-	-	-	-	-	-	-
*Ark.	78	-	-	-	-	-	-	-	-	-	-	-	-
*La.	607	-	-	-	-	-	-	-	-	-	-	-	-
Texas	383	t	+	5.	22	1.	4	5.	22	t	-	13.	57
Mont.		0	0	2.	+	5.	+	1.	+	t	+	8.	+
Wyo.		0	0	6.5	+	6.	+	5.	+	-	-	17.5	+
Colo.	333	0	0	1.5	5	3.	11	2.	7	0	0	6.5	23
Oreg.		0	0	-	-	5.	+	-	-	-	-	10.	+
Calif.	1,148	0	0	-	-	-	-	-	-	-	-	-	-
U. S.	11,824	0.8	30	2.1	75	1.5	54	4.1	147	-	-	14.1	515

° Bushels of 30 pounds.
* Omitted in calculations for U. S. percentage loss.

Table 13. Estimated reduction in yield of dry beans due to anthracnose (Colletotrichum lindemuthianum), bacterial blights (Bacterium spp.), mosaic (virus), root rots (various organisms), rust (Uromyces phaseoli typica), and other diseases, 1935.

State	Production 1,000 °Bags	Anthracnose %	Anthracnose 1,000 Bags	Bacterial Blight %	Bacterial Blight 1,000 Bags	Mosaic %	Mosaic 1,000 Bags	Root Rots %	Root Rots 1,000 Bags	Rust %	Rust 1,000 Bags	All Diseases %	All Diseases 1,000 Bags
*Maine	67	-	-	-	-	-	-	-	-	-	-	-	-
*Vt.	17	-	-	-	-	-	-	-	-	-	-	-	-
*N.Y.	874	-	-	-	-	-	-	-	-	-	-	-	-
Mich.	4,306	t	+	2.5	128	t	+	0.5	26	t	+	5.8	297
Wis.	22	0	0	t	+	5.	1	t	+	0	0	5.	1
Minn.	25	t	+	3.	1	2.	1	t	+	0	0	6.	2
*Nebr.	104	-	-	-	-	-	-	-	-	-	-	-	-
*Kans.	21	-	-	-	-	-	-	-	-	-	-	-	-
Mont.	551	0	0	2.	12	5.	30	1.	6	t	+	8.	48
*Idaho	1,306	-	-	-	-	-	-	-	-	-	-	-	-
Wyo.	410	0	0	3.	14	4.	18	2.5	11	-	-	9.5	43
Colo.	1,256	0	0	1.5	20	3.	40	2.	27	0	0	6.5	87
*N.M.	302	0	0	-	-	-	-	-	-	-	-	-	-
*Ariz.	66	0	0	-	-	-	-	-	-	-	-	-	-
Oreg.	6	0	0	-	-	5.	+	-	-	-	-	10.	+
*Calif.	3,966	0	0	-	-	-	-	-	-	-	-	-	-
U. S.	13,799	-	-	2.3	175	1.2	90	0.9	70	-	-	6.3	478

° Bags of 100 pounds.

* Omitted in calculations for U. S. percentage loss.

Table 14. Green peas for manufacture; estimated reduction in yield due to bacterial blight (Bacterium pisi), Fusarium wilt (Fusarium orthoceras pisi), Ascochyta blight (Mycosphaerella pinodes and Ascochyta spp.), root rots (various organisms), and other diseases, 1935.

State	Production Short Tons	Estimated reduction in yield due to diseases: Bacterial Blight %	Bacterial Blight Short Tons	Fusarium Wilt %	Fusarium Wilt Short Tons	Ascochyta Blight %	Ascochyta Blight Short Tons	Root Rots %	Root Rots Short Tons	All Diseases %	All Diseases Short Tons
*Maine	2,750	-	-	-	-	-	-	-	-	-	-
*N.Y.	23,600	-	-	-	-	-	-	-	-	-	-
Pa.	4,340	-	-	1.	55	t	+	20.	1,099	21.	1,154
Ohio	4,250	0.5	24	1.	47	1.	47	5.	236	10.	472
*Ind.	8,580	-	-	-	-	-	-	-	-	-	-
Ill.	10,350	1.	111	1.	111	-	-	5.	556	7.	778
Mich.	8,840	t	+	0	0	t	+	5.	466	5.1	475
Wis.	75,640	t	+	0.5	398	0	0	3.	2,389	5.	3,981
*Minn.	26,640	-	-	-	-	-	-	-	-	-	-
*Del.	4,420	-	-	-	-	-	-	-	-	-	-
Md.	21,740	0.2	49	t	+	0.5	122	10.	2,435	10.7	2,606
Va.	7,540	t	+	2.	154	-	-	-	-	2.	154
Tenn.		-	-	-	-	2.	+	-	-	2.	+
Mont.	2,950	1.	33	t	+	t	+	10.	331	11.	364
*Wyo.		t	+	t	+	-	-	-	-	t	+
Colo.	3,630	1.	42	2.	84	t	+	10.	422	14.	590
*Utah	21,810	-	-	-	-	-	-	-	-	-	-
*Wash.	15,000	-	-	-	-	-	-	-	-	-	-
Oreg.	7,000	-	-	2.	250	2.	250	40.	5,000	44.	5,500
*Other States	16,010										
U. S.	265,090	0.1	259	0.6	1,099	0.2	419	7.	12,934	8.5	16,074

* Omitted in calculations for U. S. percentage loss.

** Includes California, Idaho, Iowa, Kansas, Nebraska, New Jersey, Oklahoma, Tennessee, and Wyoming.

Table 15. Green peas for market; estimated reduction in yield due to bacterial blight (*Bacterium pisi*), Fusarium wilt (*Fusarium orthoceras pisi*), Ascochyta blight (*Mycosphaerella pinodes* and *Ascochyta* spp.), root rots (various organisms), and other diseases, 1935.

State	Production 1,000 °Bushels	Bacterial Blight %	Bacterial Blight 1,000 Bushels	Fusarium Wilt %	Fusarium Wilt 1,000 Bushels	Ascochyta Blight %	Ascochyta Blight 1,000 Bushels	Root Rots %	Root Rots 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
Mass.		2.	+	2.	+	1.	+	25.	+	50.	+
*N.Y.	554	-	-	-	-	-	-	-	-	-	-
*N.J.	408	-	-	-	-	-	-	-	-	-	-
Pa.		-	-	1.	+	t	+	20.	+	21.	+
Ohio		0.5	+	1.	+	1.	+	5.	+	10.	+
Ill.		1.	+	1.	+	-	-	5.	+	7.	+
Mich.		t	+	0	0	t	+	5.	+	5.1	+
Wis.		t	+	0.5	+	0	0	7.	+	4.	+
N.D.		-	-	t	+	-	-	t	+	t	+
Md.	15	0.2	+	t	+	0.5	+	3.	+	3.7	+
Va.	144	t	+	2.	3	-	-	-	-	2.	3
N.C.	228	1.	3	2.	6	1.	3	3.	10	9.	28
S.C.	160	-	-	0	0	5.	9	10.	19	15.	28
Ga.		2.	+	-	-	10.	+	-	-	12.	+
*Fla.	400	-	-	-	-	-	-	-	-	-	-
Tenn.		-	-	-	-	2.	+	-	-	2.	+
*Ala.	11	-	-	-	-	-	-	-	-	-	-
*Miss.	104	-	-	-	-	-	-	-	-	-	-
*La.	58	-	-	-	-	-	-	-	-	-	-
Texas	25	t	+	0.1	+	0	0	2.	1	3.1	1
Mont.		1.	+	t	+	t	+	10.	+	11.	+
*Idaho	238	-	-	-	-	-	-	-	-	-	-
Wyo.		t	+	t	+	-	-	-	-	t	+
Colo.	837	1.	10	2.	19	t	+	10.	97	14.	136
*Ariz.	22	-	-	-	-	-	-	-	-	-	-
*Wash.	578	-	-	-	-	-	-	-	-	-	-
Oreg.	83	-	-	2.	3	2.	3	40.	59	44.	65
*Calif.	4,506	-	-	-	-	-	-	-	-	-	-
U. S.	8,371	0.2	13	0.5	31	0.2	15	3.	186	4.1	261

° Bushels of 30 pounds.
* Omitted in calculations for U. S. percentage loss.

Table 16. Estimated reduction in yield of cotton due to Anthracnose (*Glomerella gossypii*), angular leaf spot (*Bacterium malvacearum*), wilt (*Fusarium vasinfectum*), root knot (*Heterodera marioni*), root rot (*Phymatotrichum omnivorum*), malnutrition (non-parasitic), and other diseases, 1935.

State	Production 1,000 Bales	Anthracnose %	Anthracnose 1,000 Bales	Angular Leaf Spot %	Angular Leaf Spot 1,000 Bales	Wilt %	Wilt 1,000 Bales	Root Knot %	Root Knot 1,000 Bales	Root Rot %	Root Rot 1,000 Bales	Malnutrition %	Malnutrition 1,000 Bales	All Diseases %	All Diseases 1,000 Bales
*Mo.	200	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Va.	30	3.	1	4.	1	-	-	-	-	0	0	5.	2	12.	4
N.C.	585	t	+	2.	15	7.	51	1.	7	0	0	10.	73	20.	146
S.C.	745	10.	80	3.	24	2.	16	2.	16	0	0	-	-	17.	136
Ga.	1,060	-	-	-	-	5.	56	-	-	0	0	-	-	5.	56
*Fla.	29	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Tenn.	320	t	+	1.	4	1.2	5	-	-	-	-	12.	47	18.2	72
*Ala.	1,060	-	-	-	-	-	-	-	-	0	0	-	-	-	-
*Miss.	1,260	-	-	-	-	-	-	-	-	0	0	-	-	-	-
Ark.	890	t	+	1.	10	5.	49	1.	10	t	+	3.	30	10.	99
La.	555	1.5	10	2.	14	3.5	23	-	-	0	0	2.5	17	18.	122
*Okla.	535	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texas	3,050	t	+	3.	121	5.	201	1.	40	12.	432	0.1	4	24.1	969
*N.M.	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Ariz.	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Calif.	205	-	-	-	-	-	-	-	-	-	-	-	-	-	-
All Others	7														
U. S.	10,734	1.	91	2.1	189	4.3	401	0.8	73	5.	432	1.9	173	17.3	1,604

* Omitted in calculations for U. S. percentage loss.

Table 17. Estimated reduction in yield of sugar beet due to nematode (*Heterodera schachtii*), curly top (virus), leaf spot (*Cercospora beticola*), Phoma rot (*Phoma betae*), and other diseases, 1935.

State	Production: 1,000 Short Tons	Sugar Beet Nematode %	Sugar Beet Nematode 1,000 Short Tons	Curly-top %	Curly-top 1,000 Short Tons	Leaf Spot %	Leaf Spot 1,000 Short Tons	Phoma Rot %	Phoma Rot 1,000 Short Tons	All Diseases %	All Diseases 1,000 Short Tons
Ohio	333	0	0	0	0	25.	128	5.	26	35.	180
Ind.		0	0	0	0	25.	+	-	-	25.	+
Mich.	777	0	0	0	0	25.	273	2.	22	29.	317
Wis.		0	0	0	0	20.	+	-	-	22.	+
Minn.		0	0	0	0	2.	+	5.	+	12.	+
Iowa		0	0	0	0	27.	+	-	-	39.5	+
N. D.		0	0	0	0	t	+	-	-	-	-
S. D.		0	0	0	0	t	+	0	0	-	-
Nebr.	606	2.	14	-	-	10.	73	-	-	17.	124
Mont.	532	0	0	10.	61	t	+	-	-	12.	73
Idaho	527	2.	12	15.	95	-	-	-	-	17.	107
Wyo.	622	-	-	-	-	t	+	t	+	2.	13
Colo.	1,823	t	+	1.5	29	5.	100	t	+	8.5	169
Utah	540	2.	13	5.	31	-	-	5.	31	14.	88
Wash.		-	-	-	-	-	-	-	-	10.	+
Calif.	1,453	2.	33	3.	50	-	-	-	-	13.	217
*Other States	771										
U. S.	7,984	0.9	72	3.1	266	6.8	574	0.9	79	15.2	1,288

* Includes Indiana, Illinois, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Kansas, Wyoming, New Mexico, and Washington.

Table 18. Estimated reduction in yield of pear due to blight (Bacillus amylovorus), scab (Venturia pyrina), leaf blight (Fabraea maculata), and other diseases, 1935.

State	Production: 1,000 Bushels	Estimated reduction in yield due to diseases: Blight %	Blight 1,000 Bushels	Scab %	Scab 1,000 Bushels	Leaf Blight %	Leaf Blight 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
*Maine	6	-	-	-	-	-	-	-	-
*N. H.	8	-	-	-	-	-	-	-	-
*Vt.	5	-	-	-	-	-	-	-	-
Mass.	45	4.	2	t	+	-	-	4.	2
*R. I.	5	-	-	-	-	-	-	-	-
Conn.	15	-	-	-	-	-	-	2.	+
*N. Y.	663	-	-	-	-	-	-	-	-
*N. J.	79	-	-	-	-	-	-	-	-
Pa.	370	8.	34	1.	4	4.	17	14.	59
Ohio	400	1.5	6	2.	9	2.	9	5.5	24
Ind.	170	5.	9	-	-	3.	6	8.	15
Ill.	659	2.	15	t	+	5.	37	12.	89
Mich.	633	t	+	5.	33	t	+	5.	33
Wis.		2.	+	5.	+	0	0	7.	+
Iowa	102	2.	2	-	-	-	-	2.	2
Mo.	470	-	-	-	-	2.	10	2.	10
*Nebr.	44	-	-	-	-	-	-	-	-
*Kans.	217	-	-	-	-	-	-	-	-
*Del.	27	-	-	-	-	-	-	-	-
Md.	106	7.	8	3.	4	2.	2	12.	14
Va.	325	3.	10	0.5	2	t	+	4.	14
W. Va.	64	t	+	5.	3	t	+	6.	4
N. C.	222	7.	17	-	-	t	+	10.	24
*S. C.	71	-	-	-	-	-	-	-	-
*Ga.	97	-	-	-	-	-	-	-	-
*Fla.	35	-	-	-	-	-	-	-	-
*Ky.	126	-	-	-	-	-	-	-	-
Tenn.	113	90.	1,017	-	-	-	-	90.	1,017
Ala.	145	30.	62	-	-	-	-	30.	62
Miss.	121	30.	52	-	-	-	-	30.	52
*Ark.	154	-	-	-	-	-	-	-	-
*La.	50	-	-	-	-	-	-	-	-
*Okla.	245	-	-	-	-	-	-	-	-
Texas	469	5.	31	0	0	0	0	15.	94
*Idaho	57	-	-	-	-	-	-	-	-
Colo.	351	t	+	0	0	0	0	t	+
*N. M.	38	-	-	-	-	-	-	-	-
*Ariz.	12	-	-	-	-	-	-		
*Utah	49	-	-	-	-	-	-		
*Nev.	8	-	-	-	-	-	-		
*Wash.	4,455	-	-	-	-	-	-		
Oreg.	3,000	1.	33	6.	195	-	-		
*Calif.	7,024	-	-	-	-	-	-		
U. S.	21,255	13.6	1,298	2.6	250	0.8	81		

*Omitted in calculations for U. S. percentage loss.

Table 19. Estimated reduction in yield of apple due to bitter rot (Glomerella cingulata), black rot (Physalospora obtusa), blotch (Phyllosticta solitaria), cedar rust (Gymnosporangium spp.), blight (Bacillus amylovorus), scab (Venturia inaequalis), and other diseases, 1935.

State	Production: 1,000 Bushels	Bitter Rot %	Bitter Rot 1,000 Bushels	Black Rot %	Black Rot 1,000 Bushels	Blotch %	Blotch 1,000 Bushels	Cedar Rust %	Cedar Rust 1,000 Bushels	Blight %	Blight 1,000 Bushels	Scab %	Scab 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
Maine	893	-	-	-	-	-	-	-	-	-	-	30.	383	30.	783
*N. H.	656	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vt.	708	-	-	-	-	-	-	0.5	3	-	-	2.	15	2.5	18
Mass.	2,418	t	+	2.	53	-	-	1.	26	1.	26	2.	53	8.	211
*R. I.	322	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Conn.	805	-	-	0	0	-	-	1.	8	0.5	4	2.5	21	4.5	37
*N. Y.	16,875	t	+	-	-	-	-	-	-	-	-	-	-	-	-
*N. J.	4,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pa.	11,440	0.1	18	1.	178	0.5	89	0.5	89	0.5	89	30.	5,329	35.6	6,325
Ohio	7,952	2.	190	0.5	48	0.1	10	1.	95	0.5	48	12.	1,140	16.3	1,553
Ind.	1,903	2.	44	-	-	t	+	-	-	2.	44	10.	221	14.	309
Ill.	7,208	t	+	1.	94	2.	187	t	+	t	+	20.	1,872	23.	2,153
Mich.	9,177	0	0	t	+	0	0	t	+	t	+	20.	2,294	20.	2,294
Wis.	2,520	0	0	t	+	t	+	1.	31	3.	93	15.	467	19.	591
Minn.	1,246	0	0	0	0	0	0	0.5	7	2.	27	4.	54	7.	95
Iowa	2,079	-	-	t	+	-	-	t	+	2.	43	2.	43	4.	86
Mo.	4,425	t	+	t	+	t	+	t	+	1.	47	6.	286	7.	333
N. D.		-	-	-	-	-	-	t	+	1.5	+	t	+	1.5	+
*S. D.	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Nebr.	450	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kans.	1,300	-	-	-	-	-	-	-	-	-	-	-	-	t	+
*Del.	1,418	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Md.	2,412	2.	56	1.5	42	0.5	14	0.5	14	1.5	42	6.	168	14.	392
Va.	16,695	t	+	t	+	t	+	2.	398	t	+	12.	2,385	16.	3,181
W. Va.	5,610	t	+	t	+	t	+	2.5	165	t	+	10.	660	15.	990
N. C.	3,975	t	+	t	+	1.	50	2.	99	7.	348	5.	248	20.	993
S. C.	276	10.	35	t	+	-	-	-	-	3.5	12	5.	17	20.	69
Ga.	855	10.	95	-	-	-	-	-	-	-	-	-	-	10.	95

Apple (Continued)

State	Production 1,000 Bushels	Bitter Rot %	Bitter Rot 1,000 Bushels	Black Rot %	Black Rot 1,000 Bushels	Blotch %	Blotch 1,000 Bushels	Cedar Rust %	Cedar Rust 1,000 Bushels	Blight %	Blight 1,000 Bushels	Scab %	Scab 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
		Estimated reduction in yield of apples due to diseases.													
Ky.	1,496	-	-	1.	17	-	-	-	-	-	-	10.	168	11.	185
Tenn.	1,064	9.	134	1.	15	2.	30	1.5	22	3.	45	12.	179	28.5	425
Ala.	525	2.	12	-	-	-	-	-	-	3.	19	10.	62	15.	93
*Miss.	145	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ark.	1,645	-	-	t	+	1.	22	t	+	-	-	25.	556	26.	578
*La.	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Okla.	382	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Texas	177	3.	7	t	+	5.	12	t	+	10.	25	0	0	28.	69
Mont.	465	0	0	0	0	0	0	0	0	1.	5	1.	5	7.	35
*Idaho	5,934	0	0	0	0	0	0	0	0	-	-	-	-	-	-
Wyo.	51	0	0	0	0	0	0	0	0	20.	13	-	-	20.	13
Colo.	1,590	0	0	0	0	0	0	0	0	t	+	0	0	t	+
*N. M.	687	0	0	0	0	0	0	0	0	-	-	0	0	-	-
*Ariz.	71	0	0	0	0	0	0	0	0	-	-	0	0	-	-
*Utah	543	0	0	0	0	0	0	0	0	-	-	0	0	-	-
*Nev.	49	0	0	0	0	0	0	0	0	-	-	0	0	-	-
*Wash.	31,390	0	0	-	-	0	0	0	0	-	-	-	-	-	-
Oreg.	3,900	0	0	-	-	0	0	0	0	-	-	5.	207	6.	249
*Calif.	10,400	0	0	-	-	0	0	0	0	t	+	-	-	-	-
U. S.	168,465	0.5	591	0.4	447	0.3	414	0.8	957	0.8	930	14.1	16,833	18.4	21,752

* Omitted in calculations for U. S. percentage loss.

Table 20. Estimated reduction in yield of peach due to leaf curl (Taphrina deformans), brown rot (Sclerotinia fructicola), virus diseases, scab (Cladosporium carpophilum), and other diseases, 1935.

State	Production 1,000 Bushels	Leaf Curl %	Leaf Curl 1,000 Bushels	Brown Rot %	Brown Rot 1,000 Bushels	Virus Diseases %	Virus Diseases 1,000 Bushels	Scab %	Scab 1,000 Bushels	All Diseases %	All Diseases 1,000 Bushels
*N.H.	2	-	-	-	-	-	-	-	-	-	-
Mass.	21	-	-	-	-	-	-	-	-	26.	7
*R. I.	6	-	-	-	-	-	-	-	-	-	-
Conn.	37	0.5	+	1.5	1	-	-	-	-	2.	1
*N.Y.	793	-	-	-	-	-	-	-	-	-	-
*N.J.	800	-	-	-	-	-	-	-	-	-	-
Pa.	1,675	8.	171	10.	213	0.5	11	2.	43	21.5	459
Ohio	1,606	2.	35	3.	52	-	-	3.	52	8.2	143
Ind.	900	5.	48	1.5	14	-	-	-	-	6.5	62
Ill.	3,285	10.	391	5.	196	t	+	1.	39	16.	626
Mich.	1,966	15.	373	3.	75	3.	75	t	+	21.	523
Iowa	81	2.	2	3.	3	-	-	-	-	5.	5
Mo.	1,186	t	+	-	-	-	-	-	-	t	+
*Nebr.	60	-	-	-	-	-	-	-	-	-	-
*Kans.	198	-	-	-	-	-	-	-	-	-	-
*Del.	225	-	-	-	-	-	-	-	-	-	-
Md.	382	2.	9	5.	22	0.5	2	2.	8	12.	52
Va.	774	2.	16	5.	42	t	+	t	+	7.	58
W.Va.	300	5.	17	3.	10	t	+	1.	3	10.	33
N.C.	2,205	0.5	14	10.	271	1.	27	5.	135	18.5	501
S.C.	1,781	t	+	5.	105	t	+	10.	209	15.	314
*Ga.	5,628	-	-	-	-	-	-	-	-	-	-
*Fla.	52	-	-	-	-	-	-	-	-	-	-
*Ky.	546	-	-	-	-	-	-	-	-	-	-
Tenn.	899	1.5	21	35.	496	t	+	t	+	36.5	517
Ala.	825	2.	19	10.	94	-	-	-	-	12.	113
Miss.	550	-	-	10.	61	-	-	-	-	10.	61
Ark.	1,320	2.	29	1.	14	-	-	t	+	8.	115
*La.	175	-	-	-	-	-	-	-	-	-	-
*Okla.	816	-	-	-	-	-	-	-	-	-	-
Texas	1,891	1.	21	3.	64	0.5	11	2.	43	11.5	246
*Idaho	160	-	-	-	-	-	-	-	-	-	-
Colo.	1,276	0	0	t	+	6.	81	0	0	6.	81
*N.M.	103	-	-	-	-	-	-	-	-	-	-
*Ariz.	67	-	-	-	-	-	-	-	-	-	-
*Utah	680	-	-	-	-	-	-	-	-	-	-
*Nev.	8	-	-	-	-	-	-	-	-	-	-
*Wash.	928	-	-	-	-	-	-	-	-	-	-
Oreg.	297	1.	3	3.	10	-	-	-	-	7.	23
*Calif.	17,876	-	-	-	-	-	-	-	-	-	-
U. S.	52,380	4.3	1,169	6.4	1,743	0.8	207	2.	532	14.5	3,940

* Omitted in calculations for U. S. percentage loss.

Table 21. Estimated reduction in yield of cherry due to brown rot (*Sclerotinia fructicola*), leaf spot (*Coccomyces hiemalis*), and other diseases, 1935.

State	Production Tons	Brown Rot %	Brown Rot Tons	Leaf Spot %	Leaf Spot Tons	All Diseases %	All Diseases Tons
Mass.		20.	+	0.5	+	30.5	+
Conn.		2.	+	1.	+	3.	+
*N. Y.	22,550	-	-	-	-	-	-
Pa.	7,360	15.	1,512	10.	1,008	27.	2,722
Ohio	4,260	2.	92	5.	229	7.	321
Ind.		-	-	5.	+	5.	+
Ill.		5.	+	5.	+	10.	+
Mich.	26,660	2.	684	20.	6,836	22.	7,520
Wis.	5,040	t	+	7.	379	7.	379
Iowa		3.	+	1.	+	4.	+
Mo.		-	-	18.	+	18.	+
Md.		5.	+	3.	+	8.	+
Va.		4.	+	4.	+	8.	+
W. Va.		0.5	+	2.	+	2.5	+
N. C.		10.	+	t	+	12.	+
Tenn.		t	+	35.	+	35.	+
Ark.		t	+	50.	+	50.	+
Texas		3.	+	-	-	3.	+
Mont.	674	0	0	t	+	3.	21
*Idaho	3,024	-	-	-	-	-	-
Colo.	4,662	0	0	0	0	0	0
*Utah	3,540	-	-	-	-	-	-
*Wash.	10,400	-	-	-	-	-	-
Oreg.	12,600	5.	685	2.	274	8.	1,096
*Calif.	16,660	-	-	-	-	-	-
Twelve States	117,430	4.	2,973	11.9	8,726	16.4	12,059

* Omitted in calculations for U. S. percentage loss.

Table 22. Estimated reduction in yield of grape from black rot (Guignardia bidwellii), and other diseases, 1935.
East of Rocky Mountains

State	Production Tons	Black Rot %	Black Rot Tons	Other Diseases %	Other Diseases Tons	All Diseases %	All Diseases Tons
*Maine	14	-	-	-	-	-	-
N. H.	36	90.	32	-	-	90.	32
*Vt.	26	-	-	-	-	-	-
Mass.	322	4.	17	20.	85	24.	102
*R. I.	154	-	-	-	-	-	-
Conn.	946	1.	10	1.	10	2.	20
*N. Y.	66,500	-	-	-	-	-	-
*N. J.	3,116	-	-	-	-	-	-
Pa.	24,750	15.	4,473	2.	596	17.	5,069
Ohio	29,110	4.	1,226	1.	306	5.	1,532
*Ind.	2,849	-	-	-	-	-	-
Ill.	6,560	3.	203	-	-	3.	203
Mich.	56,310	2.	1,173	2.	1,173	4.	2,346
Wis.	340	2.	7	2.	7	4.	14
Minn.	364	t	+	t	+	0.5	2
*Iowa	7,371	-	-	-	-	-	-
*Mo.	8,840	t	+	-	-	-	-
*Nebr.	2,584	-	-	-	-	-	-
*Kans.	3,894	-	-	-	-	-	-
*Del.	2,697	-	-	-	-	-	-
Md.	676	8.	59	1.	7	9.	66
Va.	1,541	10.	175	2.	35	12.	210
W. Va.	798	5.	44	5.	44	10.	88
N. C.	3,864	5.	215	5.	215	10.	430
S. C.	854	25.	285	-	-	25.	285
Ga.	707	5.	37	-	-	5.	37
Fla.	868	2.	19	5.	46	7.	65
*Ky.	839	-	-	-	-	-	-
Tenn.	855	40.	570	-	-	40.	570
*Ala.	522	-	-	-	-	-	-
*Miss.	208	-	-	-	-	-	-
Ark.	13,520	25.	4,507	-	-	25.	4,507
*La.	44	-	-	-	-	-	-
*Okla.	2,380	-	-	-	-	-	-
Texas	1,904	20.	586	15.	439	35.	1,025
	144,325	8.5	13,638	1.8	2,963	10.3	16,603

* Omitted in calculations for total percentage loss.

Table 23. Estimated reduction in yield of strawberry due to leaf spot (Mycosphaerella fragariae), leaf scorch (Diplocarpon earliana), dwarf (Aphelenchoides fragariae), black root and root rot (various causes), and other diseases and estimated loss from fruit rots, 1935.

State	Production	Estimated reduction in yield due to diseases											
		Leaf Spot		Leaf Scorch		Dwarf		Black Root & Root Rots		All Diseases		Fruit Rots	
	1,000 °Crates	%	1,000 Crates	%	1,000 Crates	%	1,000 Crates	%	1,000 Crates	%	1,000 Crates	%	1,000 Crates
Mass.		2.	+	-	-	t	+	8.	+	30.	+	10.	+
Conn.		0.5	+	-	-	-	-	5.	+	6.5	+	-	-
*N.Y.	459	-	-	-	-	-	-	-	-	-	-	-	-
*N.J.	460	-	-	-	-	-	-	-	-	-	-	-	-
Pa.	320	1.	4	0.5	2	-	-	10.	36	11.5	42	-	-
Ohio	238	0.2	1	-	-	-	-	3.	7	3.2	8	-	-
*Ind.	220	-	-	-	-	-	-	-	-	-	-	-	-
Ill.	348	t	+	t	+	0	0	5.	18	5.	18	-	-
Mich.	440	t	+	t	+	0	0	5.	23	5.	23	-	-
Wis.	297	t	+	t	+	0	0	5.	17	10.	34	-	-
Minn.		-	-	-	-	-	-	-	-	1.5	+	-	-
Iowa	132	3.	4	-	-	-	-	10.	14	13.	18	-	-
*Mo.	310	-	-	-	-	-	-	-	-	-	-	-	-
N.D.		t	+	-	-	-	-	-	-	1.	+	-	-
Kans.	27	-	-	-	-	-	-	-	-	-	-	-	-
Del.	468	-	-	-	-	-	-	-	-	-	-	-	-
Md.	715	1.	9	1.	9	t	+	15.	129	17.	147	-	-
Va.	693	3.	24	1.	8	-	-	10.	82	15.	122	-	-
W.Va.		t	+	-	-	-	-	t	+	-	-	-	-
N.C.	770	2.	17	2.	17	2.	17	-	-	11.	94	-	-
S.C.	40	-	-	-	-	-	-	-	-	-	-	-	-
Ga.	34	-	-	-	-	-	-	-	-	-	-	-	-
Fla.	546	-	-	-	-	-	-	-	-	-	-	-	-
Ky.	600	-	-	-	-	-	-	-	-	-	-	-	-
Tenn.	908	2.	21	10.	106	t	+	2.5	27	14.5	154	9.	90
Ala.	212	-	-	-	-	-	-	-	-	-	-	-	-
Miss.	36	-	-	-	-	-	-	-	-	-	-	-	-
Ark.	370	1.	5	1.	5	1.	5	-	-	28.	144	-	-
La.	801	8.	87	3.	33	0.5	5	-	-	26.5	289	5.	42
Okla.	28	-	-	-	-	-	-	-	-	-	-	-	-
Texas	69	1.	1	1.	1	t	+	4.	3	8.	6	0.5	+
Mont.		t	+	0	0	0	0	5.	+	11.	+	-	-
Utah	45	-	-	-	-	-	-	-	-	-	-	-	-
Wash.	765	-	-	-	-	-	-	-	-	-	-	-	-
Oreg.	588	1.	8	t	+	-	-	5.	40	26.	207	-	-
Calif.	742	-	-	-	-	-	-	-	-	-	-	-	-
U. S.	11,681	2.3	181	2.3	131	0.3	27	4.9	396	16.3	1,306	6.9	132

* Omitted in calculations for U. S. percentage loss.

° 24-quart crates, 36 pounds.

THE PLANT DISEASE REPORTER

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A Preliminary List of the Parasitic Fungi of Idaho

November 1, 1936.

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

A PRELIMINARY LIST OF THE PARASITIC FUNGI OF IDAHO

by Arthur L. Schade

Plant Disease Reporter
Supplement 95 November 1, 1936.

Contents

	Page
Introduction	77
Systematic list of Fungi	79
Host Index	101
Bibliography	109

INTRODUCTION

Previous to the present work there has been no enumeration of the fungi of Idaho. Collections have been erratic and scattered. Of these, some have been placed in the herbarium of the Department of Plant Pathology, College of Agriculture, University of Idaho, at Moscow, and are primarily those fungi responsible for disease in herbaceous plants. In view of the fact that the time allotted for identification, checking, and compilation of the already collected specimens was but ten months, it was considered advisable to limit the present preliminary list, for the most part, to those fungi parasitic on herbaceous plants. Additional collections made by the writer in the current year were restricted, therefore, by this fixed policy.

The present list purports in no way to be a comprehensive report of the fungi parasitic on the herbaceous plants of the State. Cultivated hosts received a greater share of attention than wild hosts. A number of the collections cited were received in exchange from the herbarium of the School of Forestry for specimens of tree diseases in the herbarium of the Department of Plant Pathology. The writer wishes to express appreciation for the cooperation given by the School of Forestry in this matter. The collections thus received are appropriately designated in the list. All collections reported, with a few noted exceptions, are to be found in the herbarium of the Department of Plant Pathology.

Following the list of fungi, arranged according to mycological classification, an alphabetically arranged host index is included to facilitate use of the report. After each host given for a particular fungus, appear the localities in the State (followed in parentheses by the county) from which the reported collections were made, the names of the collectors, and the years of collection. Listings which have the letters, U.I.F.P.H. No. __, after them are those which designate the duplicates of the herbarium specimens of the School of Forestry deposited in the Plant Pathology herbarium. Specimens marked with an asterisk (*) were checked for this report, but, because of the paucity of material, could not be split and remain in the forestry herbarium. A plus sign (+) following a fungus name indicates that the name is not valid according to the International Rules of Nomenclature and should receive attention for establishment.

To increase the usefulness and value of the list, a bibliography has been added to which each collection is referred in order that a description of the fungus in question may be readily found. An attempt has been made to choose descriptions which seemed to the writer to be most complete and available in the usual reference literature. In some cases it was found necessary to make use of more than one reference to insure an adequate description. The figures immediately following the fungus name refer to a paper in the bibliography in which a description is to be found. Synonymy of the fungi listed has not been undertaken, but an attempt has been made to use those names most frequently applied. The writer has avoided designating as a new species any collection that showed but minor variations from the given description. Where such variations occurred, they are indicated in appended notes to the host on which the fungus was found.

For the naming of the host plants, the writer has used as much as possible, Flora of Southeastern Washington and Adjacent Idaho, by Charles Piper and R. Kent Beattie, 1914, and A New Manual of Botany of the Central Rocky Mountains, by J. M. Coulter and Aven Nelson, 1909. In some instances the Flora of the Rocky Mountains and Adjacent Plains, by P. A. Rydberg, 1922, was consulted. The Manual of the Grasses of the United States, by A. S. Hitchcock, 1935, served for the nomenclature of the grasses.

The writer is greatly indebted to Dr. C. W. Hungerford, Head of the Department of Plant Pathology, for making possible, suggesting, and aiding in the compilation of this list of fungi. Many thanks are due Miss Vada Allen and Dr. Gordon Alcorn of the Botany Department for help in some host determinations. Dr. David H. Linder of Harvard University and Dr. George B. Cummins of Purdue University rendered valuable aid in the identification of some fungi. To Dr. John Ehrlich of the School of Forestry the writer expresses his appreciation of live interest and many helpful suggestions.

SYSTEMATIC LIST OF FUNGI

SCHIZOMYCETES

BACTERIACEAE

APLANOBACTER INSIDIOSUM McCulloch (13, p. 6)
On Medicago sativa L. Caldwell (Canyon): Hungerford, 1933. Preston (Franklin): Smith, 1920.

BACILLUS AMYLOVORUS (Burr.) Trev. (13, p. 18)
On Crataegus monogyna Jacq. var. rosea Willd. Moscow (Latah): Hungerford, 1933.
On Prunus sp. (cult. cherry). Moscow (Latah): Willis, 1915.
On Pyrus communis L. Moscow (Latah): Raeder, 1934. Kendrick (Latah): Johnson, 1923. St. Maries (Benewah): Hungerford, 1923. Payette (Payette): Hungerford, 1920.
On Pyrus malus L. Moscow (Latah): Raeder, 1934.

BACILLUS CAROTOVORUS L. R. Jones (26)
On Solanum tuberosum L. Aberdeen (Bingham). Moscow (Latah).

BACTERIUM CAMPESTRE (Pam.) EFS. (13, p. 99)
On Brassica oleracea L. Orofino (Clearwater): 1931.

BACTERIUM CORONAFACIENS C. Elliott (13, p. 122)
On Avena sativa L. Moscow (Latah): Willis, 1915.

BACTERIUM HOLCI Kendrick (13, p. 138)
On Sorghum vulgare Pers. var. sudanense (Piper) Hitchc. Tetonia (Teton): Christ, 1919.

BACTERIUM MEDICAGINIS (Sack.) EFS. (13, p. 162)
On Medicago sativa L. Sandpoint (Bonner): Longley, 1919. Parma (Canyon): Hungerford, 1923. Moscow (Latah): Hungerford, 1926. Burley (Cassia).

BACTERIUM PHASEOLI EFS. (13, p. 177)
On Phaseolus vulgaris L. Moscow (Latah): Hungerford, 1920.

BACTERIUM PISI (Sack.) EFS. (13, p. 184)
On Pisum sativum L. Arco (Butte): Hungerford, 1932. Idaho Falls (Bonneville): Raeder, 1928.

BACTERIUM SYRINGAE (van Hall) EFS. (13, p. 217)
On Syringa vulgaris L. Kooskia (Idaho): Raeder, 1932.

BACTERIUM TRANSLUCENS Jones, Johnson, Reddy (13, p. 229)
On Hordeum vulgare L. Aberdeen (Bingham): Hungerford, 1930.

BACTERIUM TRANSLUCENS SECALIS Reddy, Godkin, Johnson (13, p. 230)
On Secale cereale L. Moscow (Latah): Hungerford, 1919.

BACTERIUM TRANSLUCENS UNDULOSUM Smith, Jones, Reddy (13, p. 231)
On Triticum aestivum L. Felt (Teton): Hungerford, 1926.

BACTERIUM TUMEFACIENS EFS. & Town. (13, p. 234)
On Lycopersicum esculentum P. Miller. Moscow (Latah): Willis, 1916.
On Rubus sp. (cult. blackberry). Moscow (Latah): Hungerford, 1929.
On Vitis sp. (cult. grape). Lewiston (Nez Perce): Blodgett, 1928.

ACTINOMYCETACEAE

ACTINOMYCES SCABIES (Thaxt.) Güssow (28)
On Solanum tuberosum L. Moscow (Latah): Hungerford, 1924.

PHYCOMYCETES

ALBUGINACEAE

ALBUGO BLITI (Biv.-Bern.) O. Kuntze (61, p. 77)
On Amaranthus retroflexus L.

ALBUGO CANDIDA (Pers. ex Berk.) O. Kuntze (61, p. 64)
On Camelina microcarpa Andrz. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.
On Capsella bursa-pastoris L. Moscow (Latah): Hungerford, 1921.
On Sisymbrium altissimum L. Moscow (Latah): Willis, 1916. Lewiston (Nez Perce): Hungerford, 1925. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.

ALBUGO TRAGOPOGONIS (Pers.) S. F. Gray (61, p. 72)
On Tragopogon porrifolius L. Moscow (Latah): Vincent, 1916.
On Tragopogon pratensis L. Moscow (Latah): Schade, 1936.

PYTHIACEAE

PYTHIUM DEBARYANUM Hesse (4)
On Solanum tuberosum L. Moscow (Latah): Hungerford, 1924.

PERONOSPORACEAE

PERONOSPORA EFFUSA (Grev. ex Fr.) Rabenh. (18, p. 467)
On Chenopodium album L. Moscow (Latah): Willis, 1916.

PERONOSPORA SPARSA Berk. (18, p. 464)
On Rosa sp. Deary (Latah): Willis, 1915.

PERONOSPORA TRIFOLIORUM de Bary (18, p. 457)
On Medicago sativa L. Moscow (Latah): Willis, 1915. Lewiston (Nez Perce): Hungerford, 1919. Boise (Ada): Ashley, 1915. Caldwell (Canyon): Willis, 1915. Kendrick (Latah): Hungerford, 1923.

PERONOSPORA VICIAE de Bary (18, p. 454)
On Pisum sativum L. Twin Falls (Twin Falls): Hungerford. Idaho Falls (Bonneville).

ASCOMYCETES

EXOASCACEAE

EXOASCUS CERASI (Fckl.) Sadeb. (44, p. 69)
On Prunus avium L. Moscow (Latah): Hungerford, 1926.
On Prunus demissa (Nutt.) Walp. Moscow (Latah): Hungerford, 1919.

EXOASCUS DEFORMANS (Berk.) Fckl. (42, p. 816)
On Amygdalus persica L. Moscow (Latah): Hungerford, 1919. Coeur d' Alene (Kootenai): Longley, 1919.

ERYSIPHACEAE

ERYSIPHE CICHORACEARUM DC.+ (48, p. 193)
On Amsinckia intermedia Fisch. & Mey. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.
On Aster novae-angliae L. Moscow (Latah): Hungerford, 1935.
On Helianthus annuus L. Moscow (Latah): Woo, 1923.
On Lactuca scariola L. var. integrata Gren. & Godr. Moscow (Latah): Barber, 1917.
On Madia glomerata Hook. Moscow (Latah): Schade, 1935.

ERYSIPHE GRAMINIS DC.+ (48, p. 209)
On Bromus inermis Leyss. Moscow (Latah): Bever, 1932.
On Bromus vulgaris (Hook.) Shear. Moscow (Latah): Hungerford, 1923.
On Dactylis glomerata L. Moscow (Latah): Bever, 1932.
On Triticum aestivum L. Moscow (Latah): Larsen, 1923.

ERYSIPHE POLYGONI DC.+ (48, p. 174)
On Brassica campestris L. Hayden Lake (Kootenai): Hungerford, 1923.
On Delphinium sp. Moscow (Latah): Hungerford, 1930.
On Lupinus sp. Princeton (Latah): Engel, 1932.
On Pisum sativum L. Moscow (Latah): Barber, 1917. Caldwell (Canyon): Willis, 1915.
On Polygonum aviculare L. Moscow (Latah): Larsen, 1923.
On Trifolium hybridum L. Twin Falls (Twin Falls): Willis, 1912. Moscow (Latah): Larsen, 1923.
On Trifolium pratense L. Moscow (Latah): Poulson, 1924.

MICROSPHAERA ALNI (DC.) Wint. (48, p. 129)
On Cornus occidentalis (Torr. & A. Gray) Coville. Moscow (Latah): Whitman and Hungerford, 1935.
On Lonicera ciliosa (Pursh) Poir. Moscow (Latah): Schade, 1935.

MICROSPHAERA DIFFUSA Cke. & Pk. (48, p. 161)
On Symphoricarpos albus (L.) Blake. Bovill (Latah): Stillinger, 1920, (U.I.F.P.H. No. 563). Moscow (Latah): Schade, 1935.

PODOSPHAERA OXYACANTHAE (DC.) de Bary (48, p. 29)
On Amygdalus persica L. Lewiston (Nez Perce): Hungerford, 1928.
On Prunus pennsylvanica L. Moscow (Latah): Willis, 1916.
On Prunus sp. (cult. cherry). Moscow (Latah): Willis, 1917.
On Pyrus malus L. Moscow (Latah): Hungerford, 1919. Emmett (Gem): Willis, 1916.

SPHAEROTHECA CASTAGNEI Lev. p.p. (16, p. 8)
On Geranium viscosissimum Fisch & Mey. Moscow (Latah): Fajardo, 1924.

SPHAEROTHECA HUMULI (DC.) Burr. (48, p. 47)
On Forsellesia spinescens (A. Gray) Greene. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.
On Polemonium micranthum Benth. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.

SPHAEROTHECA HUMULI FULIGINEA (Schl.) Salm. (48, p. 49)
On Taraxacum officinale Weber. Moscow (Latah): Schade, 1935.

SPHAEROTHECA MORS-UVAE (Schw.) Berk. & Curt. (48, p. 70)
On Ribes sp. (cult. gooseberry). Sandpoint (Bonner): Hungerford, 1925. Moscow (Latah): Willis, 1915.

SPHAEROTHECA PANNOSA (Wallr. ex Fr.) Lev. (48, p. 65)
On Rosa sp. Moscow (Latah): Larsen, 1923.

UNCINULA NECATOR (Schw.) Burr. (48, p. 99)
On Psedera quinquefolia (L.) Greene. Moscow (Latah): Schade, 1935.

HELOTIACEAE

SCLEROTINIA TRIFOLIORUM Erikss. (63)
On Medicago sativa L. Coeur d' Alene (Kootenai): Hungerford, 1928. Rose Lake (Kootenai): Hungerford, 1925.
On Melilotus alba Desr. Coeur d' Alene (Kootenai): Hungerford, 1928. Rose Lake (Kootenai): Hungerford, 1925.
On Trifolium hybridum L. Sandpoint (Bonner): Hungerford and Christ, 1928.
On Trifolium pratense L. Moscow (Latah): Hungerford, 1923. Rose Lake (Kootenai): Hungerford, 1925.

SCLEROTINIA SP. (33)
On Pisum sativum L. Moscow (Latah): Hungerford, 1923.

MOLLISIACEAE

PSEUDOPEZIZA MEDICAGINIS (Lib.) Sacc. (24)
On Medicago sativa L. Moscow (Latah): Leth, 1924. Twin Falls (Twin Falls): Hungerford, 1932. Weiser (Washington): Willis, 1919. Lewiston (Nez Perce): Willis, 1915. Rexburg (Madison): Hungerford, 1925.

PSEUDOPEZIZA TRIFOLII (Biv.-Bern.) Fckl. (24)
On Trifolium pratense L. Twin Falls (Twin Falls): Hungerford, 1919.

PYRENOPEZIZA MEDICAGINIS Fckl. (23)
On Medicago sativa L. Moscow (Latah): Willis, 1915. Cottonwood (Idaho): Christ, 1919. Rexburg (Madison): Hungerford, 1925. Twin Falls (Twin Falls).

PHACIDIACEAE

COCCOMYCES DENTATUS (Schmidt ex Fr.) Sacc. (42, p. 745)
On Mahonia repens Lindl. Moscow (Latah): Schade, 1935. Hope (Bonner): Schade, 1936.
Note: Asci 50-70u x 15u; spores 40-45u x 2u.

MICROTHYRIACEAE

DIPLOCARPON ROSAE Wolf (62)
On Rosa sp. Pollock (Idaho): 1907.

HYPOCREACEAE

CLAVICEPS PURPUREA (Fr.) Tul. (50, p. 220)
On Agropyron pauciflorum (Schw.) Hitchc. Challis (Custer): Christ, 1919.
On Elymus canadensis L. Moscow (Latah): Schade, 1935.
On Elymus condensatus K. B. Presl. Preston (Franklin): Barber, 1919. Challis (Custer): Christ, 1919. Parma (Canyon): Hungerford, 1925.

DOTHIDIACEAE

PHYLLACHORA TRIFOLII (Pers. ex Fr.) Fckl. (16, p. 597)
On Trifolium pratense L. Castleford (Twin Falls): Hungerford, 1932. Hayden Lake (Kootenai): Hungerford, 1923.
On Trifolium sp. Moscow (Latah): Hungerford & Raeder, 1928.

PLOWRIGHTIA MORBOSA (Schw.) Sacc. (48, p. 40)
On Prunus demissa (Nutt.) Walp. Moscow (Latah): Kinnison, 1915.

MYCOSPHAERELLACEAE

MYCOSPHAERELLA CHIMAPHILINA (Pk. in Sacc.) House (45, p. 297; 21)
On Chimaphila corymbosa Pursh. Viola (Latah): Schade, 1936.
Note: Spots brown, sub-circular to irregular, amphigenous. Pycnidia amphigenous. Spores 12-14u x 3-4u.

MYCOSPHAERELLA PACHYASCA (Rostr.) Vester. (43, p. 613)
On Heuchera glabella Nutt. Coeur d' Alene (Kootenai): Schade, 1936.
Note: Asci 15-18u x 50-70u; spores 14-20u x 4-6u.

MYCOSPHAERELLA PACHYSTIMAE Dearn. (11, p. 246)
On Pachystima myrsinites Raf. Viola (Latah): Schade, 1936.
Note: Spots sometimes claiming whole leaf, irregular, without border. Asci 70-75u x 20-22u; spores uniseptate, 20-25u x 6-8u.

MYCOSPHAERELLA RUBI Roark (37)
On Rubus sp. (raspberry). Payette (Payette): Sherman, 1916. Falls City (Jerome): Towle, 1917.

SPHAERELLA RUMICIS (Desm.) Cke. (38, p. 512)
On Rumex obtusifolius L. Moscow (Latah): Hungerford, 1934.
Note: Probably Mycosphaerella rumicis Lindau.

PLEOSPORACEAE

VENTURIA INAEQUALIS (Cke.) Aderh. (58)
On Pyrus malus L. Moscow (Latah): Hungerford, 1923. Sandpoint (Bonner): Longley, 1919. Coeur d' Alene (Kootenai): Longley, 1919. Rose Lake (Kootenai): 1922. Bonners Ferry (Boundary): 1928.

OPHIOBOLUS GRAMINIS Sacc. (9; 39, p. 349)
On *Triticum aestivum* L. *Nezperce* (Lewis): Bever, 1934.

FUNGI IMPERFECTI

SPHAEROIDACEAE

ASCHOCHYTA MELILOTI (Trel.) J. J. Davis (7, p. 663)
On *Melilotus alba* Desr. *Moscow* (Latah): Hungerford, 1921.

PHOMA MEDICAGINIS Malbr. & Roum. (36)
Syn. *Pleospora rehmiana* (Staritz) Sacc.
On *Medicago sativa* L. *Moscow* (Latah): Willis, 1915. *Twin Falls* (Twin Falls): Hungerford, 1935.

PHYLLOSTICTA GALLICOLA Ell. & Ev. (51, p. 14)
On *Solidago missouriensis* Nutt. *Moscow* (Latah): Schade, 1935.

PHYLLOSTICTA GLOBIGERA Sacc. (47, p. 67)
On *Pyrus sitchensis* (Roem.) Piper. *Moscow* (Latah): Hungerford, 1928.

PHYLLOSTICTA MAHONIAECOLA Pass. (44, p. 100)
On *Mahonia repens* Lindl. *Viola* (Latah): Schade, 1936.
Note: Spots margined; pycnidia mostly epiphyllous and numerous. Spores uniguttulate, 6-8u x 3-4u.

PHYLLOSTICTA RIBESICIDA Speg. (46, p. 830)
On *Ribes petiolare* Dougl. *Confluence Breakfast Creek and North Fork Clearwater River* (Clearwater): Schade, 1935.

SEPTORIA ASARICOLA Allesch. (1, p. 736)
On *Asarum caudatum* Lindl. *Moscow* (Latah): Hungerford and Rueder, 1928.

SEPTORIA GROSSULARIAE (Lib.) Westend. (40, p. 491)
On *Ribes lacustre* (Pers.) Poir. *Moscow* (Latah): Hungerford, 1935.

SEPTORIA HYALINA Ell. & Ev. (39, p. 538)
On *Viola glabella* Nutt. *Moscow* (Latah): Hungerford and Raeder, 1928.

SEPTORIA MENTHICOLA Sacc. & Let. (40, p. 539)
On *Mentha canadensis* L. *Johnson's Bar in Snake River Canyon* (Idaho): Schade, 1936.
Note: Spots gray-brown, irregular, delimited by veins. Spores straight or curved, 16-34u x 1-1.5u.

SEPTORIA OXYSPORA Penz. & Sacc. var. CULMORUM Grove (47, p. 428)
On Dactylis glomerata L. Moscow (Latah): Hungerford, 1921.
Note: Leaves, culms, and glumes attacked.

SEPTORIA RUMICIS Trail (44, p. 380)
On Rumex crispus L. Moscow (Latah): Hungerford, 1923.

SEPTORIA STREPTOPIDIS Pk. (25, p. 64)
On Disporum majus (Hook.) Britt. Confluence Breakfast Creek and North Fork Clearwater River (Clearwater): Schade, 1935.
Note: Spores straight or curved, 5-8 septate, 52-82u x 3-5u.

SEPTORIA TRITICI Desm. (59)
On Triticum aestivum L. Moscow (Latah): Willis, 1919.

STAGONOSPORA ATRIPLICIS (Westend.) Lind (8, p. 683)
On Chenopodium album L. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.
Note: Pycnidia mostly epiphyllous, 90-100u in diam. Spores oblong, 14-28u x 3.5-4.5u, 1-2 septate.

LEPTOSTROMATACEAE

MELASMIA MENZIESIAE Dearn. & Barth. (10, p. 355)
On Menziesia ferruginea J. E. Smith. Pierce (Clearwater): Hubert, 1929, (U.I.F.P.H. No. 194). Confluence Breakfast Creek and North Fork Clearwater River (Clearwater): Schade, 1935.

MELANCONIACEAE

CORYNEUM BEIJERINCKII Oud. (52)
On Amygdalus persica L. Moscow (Latah): Vincent, 1919. Lewiston (Nez Perce): 1919. Parma (Canyon): Blodgett, 1930. Boise (Ada): 1929. Grandview (Owyhee): Bernard, 1929. Mica Flats (Kootenai): Hungerford, 1924.
On Prunus armeniaca L. Moscow (Latah): 1934.
On Prunus sp. (cult. cherry): Moscow (Latah): Willis, 1916. Parma (Canyon): Hungerford, 1932. Lewiston (Nez Perce): Hungerford, 1932.

CORYNEUM MICROSTICTUM Berk. & Br. (40, p. 775)
On Rubus sp. (cult. blackberry). Moscow (Latah): Hungerford, 1929.

CYLINDROSPORIUM SMILACINAE Ell. & Ev. (17, p. 58)
On Smilacina stellata (L.) Desf. Confluence Breakfast Creek and North Fork Clearwater River (Clearwater): Schade, 1935.
Note: Spores in specimen are 20-30u x 3u and continuous to 3 septate.

CYLINDROSPORIUM VERATRINUM Sacc. & Wint. (40, p. 740)
On Veratrum californicum Durand. Viola (Latah): Hungerford, 1936.
Note: Spores 63-106u x 4u.

GLOEOSPORIUM CAULIVORUM Kirchn. (60)
On Trifolium pratense L. Moscow (Latah): Hungerford, 1921.

GLOEOSPORIUM EQUISETI Ell. & Ev. (14, p. 52)
On Equisetum hyemale L. Moscow (Latah): Hungerford, 1925.
Note: Spores 26-39u x 3u - Continuous to 1-septate.

GLOEOSPORIUM PERENNANS Zeller & Childs (65)
On Pyrus malus L. Coeur d' Alene (Kootenai): Hungerford and Fischer, 1929.

GLOEOSPORIUM RIBIS (Lib.) Mont. & Desm. (49, p. 102)
Syn. Pseudopeziza ribis (Lib.) Kleb.
On Ribes vulgare L. Moscow (Latah): Kinnison, 1916.

MARSSONINA POTENTILLAE (Desm.) Magn. (40, p. 770)
Syn. Marssonia potentillae (Desm.) Fischer
On Potentilla rivalis Nutt. Moscow (Latah): Hungerford, 1921.

MONILIACEAE

ASPERGILLUS NIGER van Tiegh. (54, p. 167)
On Allium cepa L. Gooding (Gooding): 1932.

BOTRYTIS ALLII Munn (31; 57)
On Allium cepa L. Twin Falls (Twin Falls): 1925.

BOTRYTIS PAEONIAE Oud. (32)
On Paeonia sp. (cult.). Preston (Franklin): Hungerford, 1932.

BOTRYTIS TULIPAE (Lib.) Hopkins (20)
On Tulipa sp. (cult.). Moscow (Latah): Hungerford, 1925.

BOTRYTIS VULGARIS (Link ex Fr.) Fr. (41, p. 128)
On Dianthus caryophyllus L. Moscow (Latah): Hungerford, 1925.

CERCOSPORELLA HERPOTRICHOIDES Fron (53)
On Hordeum vulgare L. Nezperce (Lewis): Hungerford.
On Triticum aestivum L. Moscow (Latah): Michels, 1934. Nezperce (Lewis): Hungerford.

CERCOSPORELLA VIRGAURAE (Thüm.) Allesch. (27, p. 428)
On Solidago missouriensis Nutt. Moscow (Latah): Schade, 1936.

GLOMERULARIA CORNI Pk. (41, p. 10)
On Cornus canadensis L. Moscow (Latah): Hungerford and Raeder, 1928.

OVULARIA VICIAE (Frank) Sacc. (44, p. 542)
On Vicia americana Muhl. Moscow (Latah): Hungerford, 1928.

RAMULARIA ARNICALIS Ell. & Ev. (44, p. 557)
On Arnica cordifolia Hook. Cora (Latah): Schade, 1936. Viola (Latah): Hungerford, 1936.
Note: Spores 16-20u x 3-4u.

RAMULARIA TARAXACI Karst. (41, p. 207)
On Taraxacum officinale Weber. Mica (Kootenai): Schade, 1936.
Note: Spots amphigenous, gray, not bordered by purple concentric circles. Clusters of conidiophores distinctly amphigenous. Spores 17-34u x 4-6u; continuous to 1-septate.

RAMULARIA TULASNEI Sacc. (41, p. 203)
Syn. Mycosphaerella fragariae (Tul.) Lindau
On Fragaria bracteata Heller. Viola (Latah): Hungerford, 1936.
On Fragaria platypetala Rydb. Moscow (Latah): Hungerford, 1932. Viola (Latah): Hungerford, 1936.

RAMULARIA VARIATA J. J. Davis (8, p. 688)
On Mentha canadensis borealis (Michx.) Piper. Viola (Latah): Hungerford, 1921.

RHYNCHOSPORIUM SECALIS (Oud.) J. J. Davis (2, p. 610)
Syn. Marssonia secalis Oud.
On Hordeum vulgare L. Moscow (Latah): Hungerford, 1922.

DEMATIACEAE

ALTERNARIA SOLANI (Ell. & Mart.) Jones & Grout (34)
On Solanum tuberosum L. Blackfoot (Bingham): Hungerford. Caldwell (Canyon): Willis, 1915. Burley (Cassia): Barber, 1923.

CERCOSPORA CIRCUMSCISSA Sacc. (49, p. 134)
On Prunus pennsylvanica L. Moscow (Latah): Willis, 1916.

CERCOSPORA SYMPHORICARPI Ell. & Ev. (15, p. 70)
On Symphoricarpos albus (L.) Blake. Moscow (Latah): 1932.
Note: Spores 20-35u x 3-5u - One-septate.

CLADOSPORIUM FULVUM Cke. (49, p. 122)
On Lycopersicum esculentum P. Miller. Boise (Ada): Hungerford, 1930.

HELMINTHOSPORIUM CALIFORNICUM Mackie & Paxton (29)
On Hordeum vulgare L. Moscow (Latah): Bever, 1930.

HELMINTHOSPORIUM GRAMINEUM Rabenh. (12, p. 650)
On Hordeum vulgare L. Murtaugh (Twin Falls): Bever, 1935. Payette (Payette): Barber, 1919. Preston (Franklin): Barber, 1919. Weiser (Washington): Hungerford, 1919.

HELMINTHOSPORIUM SATIVUM Pammel, King, and Bakke (12, p. 690)
On Hordeum vulgare L. Caldwell (Canyon): Barber, 1919. Boise (Ada): Barber, 1919. Aberdeen (Bingham): Barber, 1919. Rupert (Minidoka): Burnett, 1919. Buhl (Twin Falls): Barber, 1919.

HELMINTHOSPORIUM TERES Died. (12, p. 656)
Syn. Pyrenophora teres (Died.) Drechsler.
On Hordeum vulgare L. Rupert (Minidoka): Barber, 1919.

HETEROSPORIUM GRACILE (Wallr.) Sacc. (56)
Syn. Didymellina iridis (Desm.) Höhn.
On Iris sp. (cult.) Moscow (Latah): Hungerford, 1932. Lewiston (Nez Perce): Hungerford, 1921. Boise (Ada): Hungerford, 1936.

SCOLECOTRICHUM GRAMINIS Fckl. (41, p. 348)
On Cinna latifolia (Trevir.) Griseb. Avon (Latah): Hungerford, 1926.
On Hordeum jubatum L. Moscow (Latah): Hungerford, 1920. Parma (Canyon): Hungerford, 1923.
On Hordeum nodosum L. Driggs (Teton): Hungerford, 1926.

SPONDYLOCLADIUM ATROVIRENS Harz (30)
On Solanum tuberosum L. Lewiston (Nez Perce): Hungerford, 1924.

TUBERCULARIACEAE

FUSARIUM FLOCCIFERUM Cda. (64, p. 79)
On Solanum tuberosum L. Moscow (Latah): Schade, 1936.

FUSARIUM OXYSPORUM Schl. (64, p. 117)
On Solanum tuberosum L. Moscow (Latah): Pierce, 1936.

FUSARIUM OXYSPORUM Schl. forma 7 Wollenw. (64, p. 120)
Syn. Fusarium cepae Hanzawa
On Allium cepa L. Gooding (Gooding): 1932.

FUSARIUM REDOLENS Wollenw. forma 1 Wollenw. (64, p. 127)
?Syn. Fusarium spinaciae Sherb.
On Spinacia oleracea P. Miller. Moscow (Latah): Hungerford, 1919.

FUSARIUM SAMBUCINUM Fckl. forma 6 Wollenw. (64, p. 78)
On Solanum tuberosum L. Moscow (Latah): Schade, 1936.

FUSARIUM SOLANI (Martius) var. MARTII (App. et Wollenw. sub specie) Wollenw. forma 3 Snyder (64, p. 137)
Syn. Fusarium martii phaseoli W. H. Burkh.
On Phaseolus vulgaris L. Twin Falls (Twin Falls): Hungerford, 1924. Moscow (Latah): Hungerford, 1922.

FUSARIUM TRICHOTHECIOIDES Wollenw. (64, p. 85)
On Solanum tuberosum L. Blackfoot (Bingham). Coeur d' Alene (Kootenai): Pierce, 1936.

BASIDIOMYCETES

USTILAGINACEAE

SOROSPORIUM SYNTHERISMAE (Pk.) Farl. (5, p. 38)
On Cenchrus tribuloides L. King Hill (Elmore): Walsh, 1932.
On Panicum miliaceum L. Moscow (Latah): Hungerford, 1921.

USTILAGO AVENAE (Pers.) Jens. (5, p. 7)
On Avena sativa L. Moscow (Latah): 1932.

USTILAGO BROMIVORA (Tul.) Fisch. de Wald. (5, p. 10)
On Bromus carinatus Hook. & Arn. Stites (Idaho): Stillinger, 1920, (U.I.F.P.H. No. 581*). Orofino (Clearwater): Stillinger, 1920, (U.I.F.P.H. No. 583*). Pierce (Clearwater): Stillinger, 1923, (U.I.F.P.H. No. 580*).
On Bromus marginatus Nees. Grangeville (Idaho): Christ, 1919. Moscow (Latah): 1921.
On Bromus tectorum L. Moscow (Latah): Bever, 1935. Post Falls (Kootenai): Zundel, 1926. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.

USTILAGO HORDEI (Pers.) Kellerm. & Swingle (5, p. 6)
On Hordeum vulgare L. Moscow (Latah): Willis, 1915. Weiser (Washington): Hungerford, 1920. Aberdeen (Bingham): Hungerford, 1926.

USTILAGO LEVIS (Kellerm. & Swingle) Magn. (5, p. 7)
On Avena sativa L. Payette (Payette): Barber, 1919. DeSmet (Benewah): 1919. St. Maries (Benewah). Jerome (Jerome): Barber, 1919. Nez Perce County: Christ, 1919. Aberdeen (Bingham): Hungerford, 1932. Bovill (Latah): Stillinger, 1920, (U.I.F.P.H. No. 582*). Weiser (Washington): 1920. Moscow (Latah): 1932.

USTILAGO LORENTZIANA Thüm. (5, p. 9)
On Hordeum jubatum L. Salmon (Lemhi): Wolpart, 1917, (U.I.F.P.H. No. 586*). Soda Springs (Caribou): Whitman, 1928.
On Hordeum nodosum L. Salmon (Lemhi): Christ, 1919.

USTILAGO NUDA (Jens.) Kellerm. & Swingle (5, p. 8)
On Hordeum vulgare L. Moscow (Latah): Willis, 1915.

USTILAGO PERENNANS Rostr. (5, p. 7)
On Arrhenatherum elatius (L.) Mert. & Koch.

USTILAGO STRIAEFORMIS (Westend.) Niessl (5, p. 18)
On Elymus sp. Challis (Custer): Christ, 1919.
On Phleum pratense L. Genesee (Latah): 1919. Moscow (Latah): Willis, 1915. Hayden Lake (Kootenai): Hungerford, 1923.

USTILAGO TRITICI (Pers.) Rostr. (5, p. 8)
On Triticum aestivum L. Nezperce (Lewis): 1921. Caldwell (Canyon): 1920. Aberdeen (Bingham): Hungerford, 1933. Moscow (Latah): 1921. Twin Falls (Twin Falls): Pierce, 1928.

TILLETIACEAE

TILLETIA GUYOTIANA Hariot (19)
On Bromus mollis L. Moscow (Latah): Zundel and Honey, 1925.

TILLETIA LAEVIS Kühn (5, p. 48)
On Triticum aestivum L. Rexburg (Madison): Bever, 1935.

TILLETIA TRITICI (Bjerk. ex Pers.) Wint. (5, p.48)
On Triticum aestivum L. McCammon (Bannock): Barber, 1919. Moscow (Latah): Willis, 1915. Bancroft (Bannock).

UROCYSTIS CARCINODES (Berk. & Curt.) Fisch. de Wald. (5, p. 55)
On Actaea rubra (Ait.) Willd. Stillinger, 1923, (U.I.F.P.H. No. 585).

UROCYSTIS TRILLII Jacks. (22, p. 151)
On Trillium ovatum Pursh. Pierce (Clearwater): Stillinger, 1920, (U.I.F.P.H. No. 587).

MELAMPSORACEAE

CHRYSOMYXA LEDI (Alb. & Schw.) de Bary (3, p. 34)
On Ledum columbianum Piper. Elk City (Idaho): Stillinger, 1920, (U.I.F.P.H. No. 727).

COLEOSPORIUM SOLIDAGINIS (Schw.) Thüm. (3, p. 43)
On Aster conspicuus Lindl. Potlatch (Latah): Stillinger, 1920, (U.I.F.P.H. No. 746).
On Solidago missouriensis Nutt. Moscow (Latah): Hungerford, 1923.
On Solidago serotina salebrosa Piper. Potlatch (Latah): Stillinger, 1920, (U.I.F.P.H. No. 751). Elk City (Idaho): Stillinger, 1920, (U.I.F.P.H. No. 744).
On Solidago sp. Elk River (Clearwater): Pierson, 1931, (U.I.F.P.H. No. 657).

CRONARTIUM RIBICOLA J. C. Fischer (3, p. 26)
On Grossularia inermis (Rydb.) Cov. & Britt. Coeur d' Alene (Kootenai): Hubert, 1932, (U.I.F.P.H. No. 476).
On Ribes lacustre (Pers.) Poir. Clarkia (Shoshone): Hubert, 1932, (U.I.F.P.H. No. 473).
On Ribes petiolare Dougl. Emida (Benewah): Pierson and Ehrlich, 1935, (U.I.F.P.H. No. 834).

HYALOPSORA ASPIDIOTUS (Pk.) Magn. (3, p. 10)
On Phegopteris dryopteris (L.) Fee. Bovill (Latah): Stillinger, 1920, (U.I.F.P.H. No. 803).

MILESIA POLYSTICHI Wineland (3, p. 9)
On Polystichum munitum (Kaulf.) K. B. Presl. Pierce (Clearwater): Stillinger, 1920, (U.I.F.P.H. No. 804).

PUCCINIASTRUM GOEPPERTIANUM (Kühn) Kleb. (3, p. 19)
On Vaccinium sp. Cascade (Valley): Hubert, 1928, (U.I.F.P.H. No.184).

PUCCINIASTRUM MYRTILLI (Schum.) Arth. (3, p. 18)
On Vaccinium macrophyllum (Hook.) Piper. Moscow (Latah): Hungerford, 1935. Oxford (Bannock): Stillinger, 1921, (U.I.F.P.H. No. 791).

UREDINOPSIS MACROSPERMA (Cke.) Magn. (3, p. 5)
On Pteridium aquilinum pubescens Underw. Priest River (Bonner): Schmitz, 1924, (U.I.F.P.H. No. 355). Harvard (Latah): Hubert, 1928, (U.I.F.P.H. No. 120). Headquarters (Clearwater): Hubert, 1930, (U.I.F.P.H. No. 399).

UREDINOPSIS STRUTHIOPTERIDIS Störmer (3, p. 4)
On Athyrium cyclosorum Rupr. Avon (Latah): Hungerford, 1925.

PUCCINIACEAE

CUMMINSIELLA SANGUINEA (Pk.) Arth. (3, p. 75)
On Mahonia aquifolium (Pursh) Nutt. Moscow (Latah): Schade, 1936.
On Mahonia repens Lindl. Moscow (Latah): Callahan, 1935. Chatcolet (Bonner): Schade, 1936. Granite (Bonner): Schade, 1936. Viola (Latah): Schade, 1936.

PHRAGMIDIUM DISCIFLORUM (Tode) J. F. James (3, p. 84)
On Rosa sp. Moscow (Latah): 1907.

PHRAGMIDIUM IVESIAE Syd. (3, p. 89)
On Potentilla blaschkeana Turcz. Moscow (Latah): Thomas, 1916. Winchester (Lewis): Hungerford, 1926. Worley (Kootenai): Schade, 1936.

PHRAGMIDIUM MONTIVAGUM Arth. (3, p. 86)
On Rosa sp. Moscow (Latah): Schade, 1935.

PHRAGMIDIUM OCCIDENTALE Arth. (3, p. 83)
On Rubus parviflorus Nutt. Moscow (Latah): Hungerford, 1922. Santa (Benewah): Pierson & Ehrlich, 1935, (U.I.F.P.H. No. 826*).

PHRAGMIDIUM PECKIANUM Arth. (3, p. 81)
On Rubus bartonianum M. E. Peck. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.

PHRAGMIDIUM ROSAE-ACICULARIS Liro (3, p. 85)
On Rosa gymnocarpa Nutt. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.
On Rosa sp. Moscow (Latah): Willis, 1915.

PHRAGMIDIUM ROSAE-CALIFORNICAE Diet. (3, p. 87)
On Rosa pisocarpa A. Gray. Moscow (Latah): Posey & Stillinger, 1920, (U.I.F.P.H. No. 631).

PHRAGMIDIUM SPECIOSUM (Fr.) Cke. (3, p. 88)
On Rosa sp. Moscow (Latah): Ehrlich, Pierson, Schade, 1935.

GYMNOCONIA PECKIANA (Howe) Trotter (3, p. 96)
On Rubus laciniatus Willd. St. Maries (Benewah): Emerson, 1927. Moscow (Latah): 1919.

NYSSOPSORA ECHINATA (Lév.) Arth. (3, p. 99)
On Ligusticum leibergii Cov. & Rose. Pierce (Clearwater): Stillinger, 1920, (U.I.F.P.H. No. 822).

PUCCINIA ABSINTHII (Hedw. f.) DC. (3, p. 343)
On Artemisia tridentata Nutt. Weiser (Washington): Wright, 1916. Twin Falls (Twin Falls): Hungerford, 1923.

PUCCINIA ANOMALA Rostr. (3, p. 176)
On Hordeum vulgare L. Moscow (Latah): Hungerford, 1921.

PUCCINIA ANTIRRHINI Dearn. & House (3, p. 257)
On Antirrhinum majus L. Moscow (Latah): Larsen, 1923.

PUCCINIA ASPARAGI DC. (3, p. 225)
On Asparagus officinalis L. Lewiston (Nez Perce): Blodgett, 1935.

PUCCINIA BALSAMORHIZAE Pk. (3, p. 342)
On Balsamorhiza sagittata (Pursh) Nutt. Warren (Idaho): Stillinger, (U.I.F.P.H. No. 630).

PUCCINIA BISTORTAE (Strauss) DC. (3, p. 280)
On Polygonum bistortoides Pursh. Elk River (Clearwater): Pierson, 1931, (U.I.F.P.H. No. 665).

PUCCINIA CALOCHORTI Pk. (3, p. 276)
On Calochortus elegans Pursh. Moscow (Latah): Hungerford.

PUCCINIA CARICIS GROSSULARIATA Arth. (3, p. 208)
On Grossularia inermis (Rydb.) Cov. & Britt. Elk River (Clearwater): Pierson, 1931, (U.I.F.P.H. No. 666*).
On Ribes sp. (wild currant). Pierce (Clearwater): Pinson, 1922.
On Ribes petiolare Dougl. Elk River (Clearwater): Pierson, 1931, (U.I.F.P.H. No. 652).

PUCCINIA CARICIS URTICATA (Kern) Arth. (3, p. 208)
On Urtica dioica L. Elk River (Clearwater): Pierson, 1931, (U.I.F.P.H. No. 667*).

PUCCINIA CHRYSANTHEMI Roze (3, p. 270)
On Chrysanthemum sp. (cult.). Moscow (Latah): Hungerford, 1919.

PUCCINIA CIRCAEAE Pers. (3, p. 250)
On Circaea pacifica Aschers. & Magn. Moscow (Latah): 1919. Oxford (Bannock): Stillinger, 1920, (U.I.F.P.H. No. 682).

PUCCINIA CIRSII Lasch. (3, p. 348)
On Cirsium palousense Piper. Moscow (Latah): Thomas, 1916.

PUCCINIA CLINTONII Pk. (3, p. 336)
On Pedicularis groenlandica Retz. Big Springs (Fremont): Wolpart, 1917, (U.I.F.P.H. No. 591).

PUCCINIA CNICI Martius (3, p. 346)
On Cirsium lanceolatum (L.) Hill. Moscow (Latah): Schade, 1935. Warren (Idaho): Stillinger, 1920, (U.I.F.P.H. No. 817*). Confluence Breakfast Creek and North Fork Clearwater River (Clearwater): Schade, 1935.

PUCCINIA CORONATA Cda. (3, p. 152)
On Calamagrostis rubescens Buckl. Elk River (Clearwater): Pierson, 1931, (U.I.F.P.H. No. 671).
On Cinna latifolia (Trevir.) Griseb. Avon (Latah): Hungerford, 1926.
On Holcus lanatus L. Moscow (Latah): Hungerford, 1928. Headquarters (Clearwater): Hubert, 1929, (U.I.F.P.H. No. 188).
On Rhamnus alnifolia L. Bovill (Latah): Hungerford, 1931.
On Shepherdia canadensis (L.) Nutt. Champion Creek (Custer): Hungerford, 1932.

PUCCINIA CRANDALLII Pammel & Hume (3, p. 162)
On Symphoricarpos albus (L.) Blake. Elk River (Clearwater): Stillinger, 1923, (U.I.F.P.H. No. 679).
On Symphoricarpos sp. Pierce (Clearwater): Stillinger, 1923, (U.I.F.P.H. No. 677).

PUCCINIA CYANI (Schleich.) Pass. (3, p. 349)
On Centaurea cyanus L. Moscow (Latah): Schade, 1935.

PUCCINIA DIFFORMIS Kunze (3, p. 260)
On Galium aparine L. Bovill (Latah): Pierson, 1931, (U.I.F.P.H. No. 673).

PUCCINIA EXTENSICOLA HIERACIATA (Schw.) Arth. (3, p. 199)
On Senecio columbianus Greene. Bertha Hill (Clearwater): Ehrlich, 1936.

PUCCINIA GENTIANAE (Strauss) Link (3, p. 322)
On Gentiana parryi Engelm. Winchester (Lewis): Hungerford, 1923.

PUCCINIA GLUMARUM (Schmidt) Erikss. & Henn. (3, p. 186)
On Agropyron cristatum (L.) Gaertn. Moscow (Latah): Willis, 1916.
On Bromus marginatus Nees. Moscow (Latah): Hungerford, 1919.
On Bromus rubens L. Moscow (Latah): Hungerford, 1921.
On Bromus vulgaris (Hook.) Shear. Moscow (Latah): Hungerford, 1921.
On Elymus condensatus K. B. Presl. Twin Falls (Twin Falls): Hungerford, 1921. Parma (Canyon): Hungerford, 1925. Moscow (Latah): Hungerford, 1925.
On Elymus glaucus Buckl. Moscow (Latah): Leth, 1924. Winchester (Lewis): Hungerford, 1926. Avon (Latah): Hungerford, 1925.
On Festuca octoflora Walt. Moscow (Latah): Raeder, 1926.
On Hordeum jubatum L. Gooding (Gooding): Hungerford, 1919. Jerome (Jerome): Hungerford, 1919. Moscow (Latah): 1919. Parma (Canyon): Raeder, 1925. Pocatello (Bannock): Jackson, 1918. Twin Falls (Twin Falls): Hungerford, 1919. Emmett (Gem): Hungerford, 1935.

On Hordeum nodosum L. Moscow (Latah): Hungerford, 1921.
On Hordeum vulgare L. Moscow (Latah): Raeder, 1926.
On Hystrix californica (Boland.) O. Kuntze. Moscow (Latah): Hungerford, 1928.
On Triticum aestivum L. Nezperce (Lewis): Bristol, 1921. Grangeville (Idaho): Bristol, 1921. Moscow (Latah): Humphrey, 1915.
On Triticum compactum Host. Felt (Teton): Hungerford, 1930. Troy (Latah): Barber, 1919. Cambridge (Washington): Barber, 1919. Moscow (Latah): Hungerford, 1921. Juliaetta (Latah): Dunlap and Pierce, 1921.

PUCCINIA GRAMINIS Pers. (3, p. 173)
On Berberis vulgaris L. Moscow (Latah): Barber, 1917.
On Elymus canadensis L. Moscow (Latah): Leth, 1924.
On Elymus glaucus Buckl. Avon (Latah): Hungerford, 1925.
On Hordeum jubatum L. Emmett (Gem): Hungerford, 1935.
On Hordeum vulgare L. Sandpoint (Bonner): Schade, 1935.

PUCCINIA GRAMINIS AVENAE Erikss. & Henn. (3, p. 175)
On Avena sativa L. Caldwell (Canyon): Barber, 1919.

PUCCINIA GRAMINIS PHLEI-PRATENSIS (Erikss. & Henn.) Stak. & Piem. (3, p.176)
On Phleum pratense L. Moscow (Latah): Larsen, 1923. Bovill (Latah): Stillinger, 1920, (U.I.F.P.H. No. 789).

PUCCINIA GRAMINIS TRITICI Erikss. & Henn. (3, p. 175)
On Triticum aestivum L. Kimberly (Twin Falls): Barber, 1919. Star (Ada): Barber, 1919. Burley (Cassia): Barber, 1919. Weiser (Washington): Barber, 1919. Twin Falls (Twin Falls): Pierce, 1928.

PUCCINIA HELIANTHI Schw. (3, p. 267)
On Helianthus sp. Lewiston (Nez Perce): Hungerford, 1923. Moscow (Latah): Larsen, 1923.

PUCCINIA HEUCHERAE (Schw.) Diet. (3, p. 292)
On Mitella stauropetala Piper. Viola (Latah): Schade, 1936.
On Tiarella unifoliata Hook. Moscow (Latah): Thomas, 1916. Bovill (Latah): Pierson, 1931, (U.I.F.P.H. No. 668).

PUCCINIA HIERACII (Schum.) Martius (3, p. 351)
On Hieracium albiflorum Hook. Warren (Idaho): Stillinger, 1920, (U.I.F.P.H. No. 816).
On Taraxacum officinale Weber. Moscow (Latah): Schade, 1935. Confluence Breakfast Creek and North Fork Clearwater River (Clearwater): Schade, 1935.

PUCCINIA INTERVENIENS (Pk.) Bethel (3, p. 131)
On Sidalcea crenulata A. Nels. Pierce (Clearwater): Stillinger, 1920, (U.I.F.P.H. No. 821).

PUCCINIA JONESII TYPICA Arth. (3, p. 316)
On Leptotaenia multifida Nutt. Juliaetta (Latah): 1906. Boles (Idaho): Raeder, 1924. Moscow (Latah): Hungerford, 1922.

PUCCINIA MALVACEARUM Bert. (3, p. 246)
On Althaea rosea L. Kamiah (Lewis): Willis. Moscow (Latah): Larsen, 1923. Lewiston (Nez Perce): Willis, 1915. St. Maries (Benewah): Hungerford, 1923.
On Malva rotundifolia L. Moscow (Latah): Hungerford, 1921. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.

PUCCINIA MCCLATCHIEANA Diet. & Holw. (3, p. 191)
On Scirpus microcarpus K. B. Presl. Boise (Ada): Stillinger, 1920, (U.I.F.P.H. No. 814). Bovill (Latah): Stillinger, 1920, (U.I.F.P.H. No. 809*).

PUCCINIA MESOMAJALIS Berk. & Curt. (3, p. 278)
On Clintonia uniflora (Schult.) Kunth. Moscow (Latah): Hungerford, 1922. Elk River (Clearwater): Pierson, 1931, (U.I.F.P.H. No. 674).

PUCCINIA MINUSSENSIS Thüm. (3, p. 355)
On Lactuca pulchella (Pursh) DC. Twin Falls (Twin Falls): Hungerford, 1923.

PUCCINIA OBSCURA Shroet. (3, p. 186)
On Luzula campestris (L.) DC. Elk River (Clearwater): Hungerford, 1927.

PUCCINIA OENOTHERAE Vize (3, p. 248)
On Sphaerostigma contortum (Dougl.) Wolf. Roberts (Jefferson): Christ, 1919.

PUCCINIA ORTONII Jacks. (3, p. 321)
On Dodecatheon pauciflorum (Durand) Greene. Warren (Idaho): Stillinger, 1920, (U.I.F.P.H. No. 819).

PUCCINIA PARKERAE Diet. & Holw. (3, p. 211)
On Ribes lacustre (Pers.) Poir. Moscow (Latah): Pinson, 1919. Priest River (Bonner): Stillinger, 1919, (U.I.F.P.H. No. 805).

PUCCINIA PATTERSONIANA Arth. (3, p. 272)
On Sitanion jubatum J. G. Smith. Parma (Canyon): Hungerford, 1923.

PUCCINIA PENTSTEMONIS Pk. (3, p. 123)
On Pentstemon triphyllus Dougl. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.
Note: Pedicels often much longer than spores.

PUCCINIA PIMPINELLAE (Strauss) Martius (3, p. 315)
On Osmorrhiza brevipes Cov. & Rose. Wallace (Shoshone): Stillinger, 1924, (U.I.F.P.H. No. 681).

PUCCINIA PLUMBARIA Pk. (3, p. 325)
On Microsteris gracilis (Dougl.) Greene. Moscow (Latah): Schade, 1936.
On Microsteris humilis Greene. Moscow (Latah): Schade, 1936. Plummer (Benewah): Schade, 1936.

PUCCINIA POLYGONI-AMPHIBII PERSICARIAE (Strauss) Arth. (3, p. 232)
On Polygonum muhlenbergii (Meissn.) S. Wats. Stites (Idaho): Stillinger, 1920, (U.I.F.P.H. No. 790). Priest River (Bonner): Stillinger, 1919, (U.I.F.P.H. No. 796).

PUCCINIA PORPHYROGENITA Curt. (3, p. 251)
On Cornus canadensis L. Elk River (Clearwater): Pierson, 1931, (U.I.F.P.H. No. 658).

PUCCINIA PORRI (Sow.) Wint. (3, p. 221)
On Allium schoenoprasum L. Moscow (Latah): Hungerford, 1935.

PUCCINIA PULSATILLAE Kalchbr. (3, p. 184)
On Trautvetteria grandis Nutt. Bungalow (Clearwater): Stillinger, 1923, (U.I.F.P.H. No. 799).

PUCCINIA RIBIS DC. (3, p. 295)
On Ribes triste Pall. Little North Fork, Clearwater River (Clearwater): Putnam, 1929, (U.I.F.P.H. No. 173).

PUCCINIA RUBIGO-VERA AGROPYRI (Erikss.) Arth. (3, p. 178)
On Aquilegia formosa Fisch. Moscow (Latah): Bever, 1936.
On Clematis ligusticifolia Nutt. Twin Falls (Twin Falls): Hungerford, 1923. Riggins (Idaho): Allen, 1936.
On Delphinium nelsonii Greene. Johnson's Bar in Snake River Canyon (Idaho): Schade, 1936.
On Viorna hirsutissima (Pursh) Heller. Tensed (Benewah): Schade, 1936.

PUCCINIA RUBIGO-VERA AGROPYRINA (Erikss.) Arth. (3, p. 180)
On Agropyron repens L. Weiser (Washington): Hungerford, 1930.

PUCCINIA RUBIGO-VERA APOCRYPTA (Ell. & Tr.) Arth. (3, p. 182)
On Hydrophyllum albifrons Heller. Elk River (Clearwater): Pierson, 1931, (U.I.F.P.H. No. 663). Moscow (Latah): Thomas, 1916.
On Mertensia lanceolata (Pursh) DC. Coeur d' Alene (Kootenai): Hubert, 1929, (U.I.F.P.H. No. 421).
On Mertensia subcordata Greene. Elk City (Idaho): Stillinger, 1920, (U.I.F.P.H. No. 795).

PUCCINIA RUBIGO-VERA SECALIS (Erikss.) Carl. (3, p. 181)
On Secale cereale L. Moscow (Latah): Hungerford and Raeder, 1921.

PUCCINIA RUBIGO-VERA TRITICI (Erikss. & Henn.) Carl. (3, p. 181)
On Triticum aestivum L. Kimberly (Twin Falls): Barber, 1919. Rathdrum (Kootenai): Hungerford, 1923. Moscow (Latah): Hungerford, 1923.
On Triticum compactum Host. Moscow (Latah): Willis, 1915.

PUCCINIA STIPAE Arth. (3, p. 140)
On Chrysothamnus sp. Twin Falls (Twin Falls): Hungerford, 1923.

PUCCINIA VAGANS EPILOBII-TETRAGONI DC. (3, p. 313)
On Epilobium paniculatum Nutt. Moscow (Latah): Bever, 1935.

PUCCINIA VIOLAE (Schum.) DC. (3, p. 311)
On Viola adunca J. E. Smith. Juliaetta (Latah): Darlington, 1906.
On Viola canadensis L. Greer (Clearwater): Stillinger, 1921, (U.I.F.P.H. No. 788).
On Viola glabella Nutt. Pierce (Clearwater): Stillinger, 1920, (U.I.F.P.H. No. 794).
On Viola sp. Bovill (Latah): Pierson, 1931, (U.I.F.P.H. No. 656). Elk City (Clearwater): Stillinger, 1920, (U.I.F.P.H. No. 806). Hungerford, 1926.

PUCCINIA XANTHII Schw. (3, p. 189)
On Xanthium speciosum Kearney. Caldwell (Canyon): Stillinger, 1920, (U.I.F.P.H. No. 770).

GYMNOSPORANGIUM JUVENESCENS Kern (3, p. 364)
On Amelanchier alnifolia Nutt. Fish Haven (Bear Lake): Whitman, 1928.

UROMYCES CARYOPHYLLINUS (Schrank) Wint. (3, p. 285)
On Dianthus sp. Moscow (Latah): Barber, 1917.
Note: According to the International rules this name should be Uromyces dianthi (Pers.) Niessl.

UROMYCES FABAE (Pers.) de Bary (3, p. 278)
On Lathyrus bijugatus T. G. White. Coeur d' Alene (Kootenai): Schade, 1936.

UROMYCES HETERODERMUS Syd. (3, p. 278)
On Erythronium grandiflorum Pursh. Dover (Bonner): Schade, 1936. Worley (Kootenai): Schade, 1936.

UROMYCES POLYGONI (Pers.) Fckl. (3, p. 230)
On Polygonum aviculare L. Moscow (Latah): Raeder, 1934.

UROMYCES PROBUS Arth. (3, p. 228)
On Olsynium grandiflorum (Dougl.) Raf. Worley (Kootenai): Schade and Pierce, 1936.

UROMYCES RUDBECKIAE Arth. & Holw. (3, p. 201)
On Rudbeckia occidentalis Nutt. Confluence Breakfast Creek and North Fork Clearwater River (Clearwater): Schade, 1935.

UROMYCES TRIFOLII FALLENS (Desm.) Arth. (3, p. 305)
On Trifolium pratense L. Twin Falls (Twin Falls): Raeder, 1924. Hayden Lake (Kootenai): Hungerford, 1923.

UROMYCES TRIFOLII HYBRIDI (W. H. Davis) Arth. (3, p. 304)
On Trifolium hybridum L. Morton (Bonner): Hungerford, 1925. Moscow (Latah): Larsen, 1923.

UROMYCES TRIFOLII TRIFOLII-REPENTIS (Liro) Arth. (3, p. 304)
On Trifolium repens L. Lewiston (Nez Perce): Hungerford, 1919.

UROMYCES ZYGADENI Peck (3, p. 221)
On Zygadenus venenosus S. Wats. Twin Falls (Twin Falls): Murphy, 1930.

THELEPHORACEAE

CORTICIUM VAGUM Berk. & Curt. (6)
On Solanum tuberosum L. Moscow (Latah): Hungerford, 1924. Lewiston, (Nez Perce): Hungerford, 1925.

CLAVARIACEAE

TYPHULA GRAMINUM Karst. (35)
On Agropyron cristatum (L.) Gaertn. Tetonia (Teton): Hungerford, 1936.
On Dactylis glomerata L. Moscow (Latah): Raeder, 1932.
On Hordeum vulgare L. Sandpoint (Bonner): Remsberg, 1932.
On Triticum aestivum L. Squirrel (Fremont): Burkholder, 1926. Donnelly (Valley): Mayer, 1932. Hill City (Camas): Hungerford, 1931. Sandpoint (Bonner): Christ, 1931. Felt (Teton): Hungerford, 1926. Soda Springs (Caribou): Finch, 1934.

HOST INDEX

:taea rubra
Urocystis carcinodes, 91.

;ropyron cristatum
Puccinia glumarum, 95.
Typhula graminum, 100.

;ropyron pauciflorum
Claviceps purpurea, 84.

;ropyron repens
Puccinia rubigo-vera agropyrina, 98.

.lium cepa
Aspergillus niger, 87.
Botrytis allii, 87.
Fusarium oxysporum forma 7, 89.

.lium schoenoprasum
Puccinia porri, 98.

.thaea rosea
Puccinia malvacearum, 97.

naranthus retroflexus
Albugo bliti, 80.

nelanchier alnifolia
Gymnosporangium juvenescens, 99.

nsinckia intermedia
Erysiphe cichoraccarum, 81.

nygdalus persica
Coryneum beijerinckii, 86.
Exoascus deformans, 81.
Podosphaera oxyacanthae, 82.

ntirrhinum majus
Puccinia antirrhini, 94.

quilegia formosa
Puccinia rubigo-vera agropyri, 98.

rnica cordifolia
Ramularia arnicalis, 88.

Arrhenatherum elatius
Ustilago perennans, 91.

Artemisia tridentata
Puccinia absinthii, 94.

Asarum caudatum
Septoria asaricola, 85.

Asparagus officinalis
Puccinia asparagi, 94.

Aster conspicuus
Coleosporium solidaginis, 92.

Aster novae-angliae
Erysiphe cichoracearum, 81.

Athyrium cyclosorum
Uredinopsis struthiopteridis, 92.

Avena sativa
Bacterium coronafaciens, 79.
Puccinia graminis avenae, 96.
Ustilago avenae, 90.
Ustilago levis, 91.

Balsamorhiza sagittata
Puccinia balsamorhizae, 94.

Berberis vulgaris
Puccinia graminis, 96.

Brassica campestris
Erysiphe polygoni, 82.

Brassica oleracea
Bacterium campestre, 79.

Bromus carinatus
Ustilago bromivora, 90.

Bromus inermis
Erysiphe graminis, 81.

Bromus marginatus
    Puccinia glumarum, 95.
    Ustilago bromivora, 90.

Bromus mollis
    Tilletia guyotiana, 91.

Bromus rubens
    Puccinia glumarum, 95.

Bromus tectorum
    Ustilago bromivora, 90.

Bromus vulgaris
    Erysiphe graminis, 81.
    Puccinia glumarum, 95.

Calamagrostis rubescens
    Puccinia coronata, 95.

Calochortus elegans
    Puccinia calochorti, 94.

Camelina microcarpa
    Albugo candida, 80.

Capsella bursa-pastoris
    Albugo candida, 80.

Cenchrus tribuloides
    Sorosporium syntherismae, 90.

Centaurea cyanus
    Puccinia cyani, 95.

Chenopodium album
    Peronospora effusa, 81.
    Stagonospora atriplicis, 86.

Chimaphila corymbosa
    Mycosphaerella chimaphilina, 84.

Chrysanthemum sp. (cult.)
    Puccinia chrysanthemi, 94.

Chrysothamnus sp.
    Puccinia stipae, 99.

Cinna latifolia
    Puccinia coronata, 95.
    Scolecotrichum graminis, 89.

Circaea pacifica
    Puccinia circaeae, 94.

Cirsium lanceolatum
    Puccinia cnici, 95.

Cirsium palousense
    Puccinia cirsii, 94.

Clematis ligusticifolia
    Puccinia rubigo-vera agropyri, 98.

Clintonia uniflora
    Puccinia mesomajalis, 97.

Cornus canadensis
    Glomerularia corni, 88.
    Puccinia porphyrogenita, 98.

Cornus occidentalis
    Microsphaera alni, 82.

Crataegus monogyna rosea
    Bacillus amylovorus, 79.

Dactylis glomerata
    Erysiphe graminis, 81.
    Septoria oxyspora culmorum, 86.
    Typhula graminum, 100.

Delphinium nelsonii
    Puccinia rubigo-vera agropyri, 98.

Delphinium sp.
    Erysiphe polygoni, 82.

Dianthus caryophyllus
    Botrytis vulgaris, 87.

Dianthus sp.
    Uromyces caryophyllinus, 99.

Disporum majus
    Septoria streptopidis, 86.

Dodecatheon pauciflorum
Puccinia ortonii, 97.

Elymus canadensis
Claviceps purpurea, 84.
Puccinia graminis, 96.

Elymus condensatus
Claviceps purpurea, 84.
Puccinia glumarum, 95.

Elymus glaucus
Puccinia glumarum, 95.
Puccinia graminis, 96.

Elymus sp.
Ustilago striaeformis, 91.

Epilobium paniculatum
Puccinia vagans epilobii-tetragoni, 99.

Equisetum hyemale
Gloeosporium equiseti, 87.

Erythronium grandiflorum
Uromyces heterodermus, 99.

Festuca octoflora
Puccinia glumarum, 95.

Forsellesia spinescens
Sphaerotheca humuli, 82.

Fragaria bracteata
Ramularia tulasnei, 88.

Fragaria platypetala
Ramularia tulasnei, 88.

Galium aparine
Puccinia difformis, 95.

Gentiana parryi
Puccinia gentianae, 95.

Geranium viscosissimum
Sphaerotheca castagnei, 82.

Grossularia inermis
Cronartium ribicola, 92.
Puccinia caricis grossulariata, 94.

Helianthus annuus
Erysiphe cichoracearum, 81.

Helianthus sp.
Puccinia helianthi, 96.

Heuchera glabella
Mycosphaerella pachyasca, 84.

Hieracium albiflorum
Puccinia hieracii, 96.

Holcus lanatus
Puccinia coronata, 95.

Hordeum jubatum
Puccinia glumarum, 95.
Puccinia graminis, 96.
Scolecotrichum graminis, 89.
Ustilago lorentziana, 91.

Hordeum nodosum
Puccinia glumarum, 96.
Scolecotrichum graminis, 89.
Ustilago lorentziana, 91.

Hordeum vulgare
Bacterium translucens, 80.
Cercosporella herpotrichoides, 88.
Helminthosporium californicum, 89.
Helminthosporium gramineum, 89.
Helminthosporium sativum, 89.
Helminthosporium teres, 89.
Puccinia anomala, 94.
Puccinia glumarum, 96.
Puccinia graminis, 96.
Rhynchosporium secalis, 88.
Typhula graminum, 100.
Ustilago hordei, 90.
Ustilago nuda, 91.

Hydrophyllum albifrons
Puccinia rubigo-vera apocrypta, 98.

Hystrix californica
Puccinia glumarum, 96.

Iris sp. (cult.)
Heterosporium gracile, 89.

Lactuca pulchella
Puccinia minussensis, 97.

Lactuca scariola integrata
Erysiphe cichoracearum, 81.

Lathyrus bijugatus
Uromyces fabae, 99.

Ledum columbianum
Chrysomyxa ledi, 92.

Leptotaenia multifida
Puccinia jonesii typica, 97.

Ligusticum leibergii
Nyssopsora echinata, 93.

Lonicera ciliosa
Microsphaera alni, 82.

Lupinus sp.
Erysiphe polygoni, 82.

Luzula campestris
Puccinia obscura, 97.

Lycopersicum esculentum
Bacterium tumefaciens, 80.
Cladosporium fulvum, 89.

Madia glomerata
Erysiphe cichoracearum, 81.

Mahonia aquifolium
Cumminsiella sanguinea, 93.

Mahonia repens
Coccomyces dentatus, 83.
Cumminsiella sanguinea, 93.
Phyllosticta mahoniaecola, 85.

Malva rotundifolia
Puccinia malvacearum, 97.

Medicago sativa
Aplanobacter insidiosum, 79.
Bacterium medicaginis, 79.
Peronospora trifoliorum, 81.
Phoma medicaginis, 85.
Pseudopeziza medicaginis, 83.
Pyrenopeziza medicaginis, 83.
Sclerotinia trifoliorum, 83.

Melilotus alba
Ascochyta meliloti, 85.
Sclerotinia trifoliorum, 83.

Mentha canadensis
Septoria menthicola, 85.

Mentha canadensis borealis
Ramularia variata, 88.

Menziesia ferruginea
Melasmia menziesiae, 86.

Mertensia lanceolata
Puccinia rubigo-vera apocrypta, 98

Mertensia subcordata
Puccinia rubigo-vera apocrypta, 98

Microsteris gracilis
Puccinia plumbaria, 98.

Microsteris humilis
Puccinia plumbaria, 98.

Mitella stauropetala
Puccinia heucherae, 96.

Olsynium grandiflorum
Uromyces probus, 100.

Osmorrhiza brevipes
Puccinia pimpinellae, 98.

Pachystima myrsinites
    Mycosphaerella pachystimae, 84.

Paeonia sp. (cult.)
    Botrytis paeoniae, 87.

Panicum miliaceum
    Sorosporium syntherismae, 90.

Pedicularis groenlandica
    Puccinia clintonii, 94.

Pentstemon triphyllus
    Puccinia pentstemonis, 97.

Phaseolus vulgaris
    Bacterium phaseoli, 79.
    Fusarium solani martii forma 3, 90.

Phegopteris dryopteris
    Hyalopsora aspidiotus, 92.

Phleum pratense
    Puccinia graminis phlei-pratensis, 96.
    Ustilago striaeformis, 91.

Pisum sativum
    Bacterium pisi, 79.
    Erysiphe polygoni, 82.
    Peronospora viciae, 81.
    Sclerotinia sp., 83.

Polemonium micranthum
    Sphaerotheca humuli, 82.

Polygonum aviculare
    Erysiphe polygoni, 82.
    Uromyces polygoni, 99.

Polygonum bistortoides
    Puccinia bistortae, 94.

Polygonum muhlenbergii
    Puccinia polygoni-amphibii persicariae, 98.

Polystichum munitum
    Milesia polystichi, 92.

Potentilla blaschkeana
    Phragmidium ivesiae, 93.

Potentilla rivalis
    Marssonina potentillae, 87.

Prunus armeniaca
    Coryneum beijerinckii, 86.

Prunus avium
    Exoascus cerasi, 81.

Prunus demissa
    Exoascus cerasi, 81.
    Plowrightia morbosa, 84.

Prunus pennsylvanica
    Cercospora circumscissa, 88.
    Podosphaera oxyacanthae, 82.

Prunus sp. (cult. cherry)
    Bacillus amylovorus, 79.
    Coryneum beijerinckii, 86.
    Podosphaera oxyacanthae, 82.

Psedera quinquefolia
    Uncinula necator, 82.

Pteridium aquilinum pubescens
    Uredinopsis macrosperma, 92.

Pyrus communis
    Bacillus amylovorus, 79.

Pyrus malus
    Bacillus amylovorus, 79.
    Gloeosporium perennans, 87.
    Podosphaera oxyacanthae, 82.
    Venturia inaequalis, 84.

Pyrus sitchensis
    Phyllosticta globigera, 85.

Rhamnus alnifolia
    Puccinia coronata, 95.

Ribes lacustre
Cronartium ribicola, 92.
Puccinia parkerae, 97.
Septoria grossulariae, 85.

Ribes petiolare
Cronartium ribicola, 92.
Phyllosticta ribesicida, 85.
Puccinia caricis grossulariata, 94.

Ribes triste
Puccinia ribis, 98.

Ribes vulgare
Gloeosporium ribis, 87.

Ribes sp. (wild currant)
Puccinia caricis grossulariata, 94.

Ribes sp. (cult. gooseberry)
Sphaerotheca mors-uvae, 82.

Rosa gymnocarpa
Phragmidium rosae-acicularis, 93.

Rosa pisocarpa
Phragmidium rosae-californicae, 93.

Rosa sp.
Diplocarpon rosae, 83.
Peronospora sparsa, 81.
Phragmidium disciflorum, 93.
Phragmidium montivagum, 93.
Phragmidium rosae-acicularis, 93.
Phragmidium speciosum, 93.
Sphaerotheca pannosa, 82.

Rubus bartonianum
Phragmidium peckianum, 93.

Rubus laciniatus
Gymnoconia peckiana, 93.

Rubus parviflorus
Phragmidium occidentale, 93.

Rubus sp. (cult blackberry)
Bacterium tumefaciens, 80.
Coryneum microstictum, 86.

Rubus sp. (raspberry)
Mycosphaerella rubi, 84.

Rudbeckia occidentalis
Uromyces rudbeckiae, 100.

Rumex crispus
Septoria rumicis, 86.

Rumex obtusifolius
Sphaerella rumicis, 84.

Scirpus microcarpus
Puccinia mcclatchieana, 97.

Secale cereale
Bacterium translucens secalis, 80.
Puccinia rubigo-vera secalis, 99.

Senecio columbianus
Puccinia extensicola hieraciata, 9

Shepherdia canadensis
Puccinia coronata, 95.

Sidalcea crenulata
Puccinia interveniens, 96.

Sisymbrium altissimum
Albugo candida, 80.

Sitanion jubatum
Puccinia pattersoniana, 97.

Smilacina stellata
Cylindrosporium smilacinae, 87.

Solanum tuberosum
Actinomyces scabies, 80.
Alternaria solani, 88.
Bacillus carotovorus, 79.
Corticium vagum, 100.
Fusarium flocciferum, 89.
Fusarium oxysporum, 89.
Fusarium sambucinum forma 6, 90.
Fusarium trichothecioides, 90.
Pythium debaryanum, 80.
Spondylocladium atrovirens, 89.

Solidago missouriensis
    Cercosporella virgaurae, 88.
    Coleosporium solidaginis, 92.
    Phyllosticta gallicola, 85.

Solidago serotina salebrosa
    Coleosporium solidaginis, 92.

Solidago sp.
    Coleosporium solidaginis, 92.

Sorghum vulgare sudanense
    Bacterium holci, 79.

Sphaerostigma contortum
    Puccinia oenotherae, 97.

Spinacia oleracea
    Fusarium redolens forma 1, 90.

Symphoricarpos albus
    Cercospora symphoricarpi, 89.
    Microsphaera diffusa, 82.
    Puccinia crandallii, 95.

Symphoricarpos sp.
    Puccinia crandallii, 95.

Syringa vulgaris
    Bacterium syringae, 79.

Taraxacum officinale
    Puccinia hieracii, 96.
    Ramularia taraxaci, 88.
    Sphaerotheca humuli fuliginea, 82.

Tiarella unifoliata
    Puccinia heucherae, 96.

Tragopogon porrifolius
    Albugo tragopogonis, 80.

Tragopogon pratensis
    Albugo tragopogonis, 80.

Trautvetteria grandis
    Puccinia pulsatillae, 98.

Trifolium hybridum
    Erysiphe polygoni, 82.
    Sclerotinia trifoliorum, 83.
    Uromyces trifolii hybridi, 100.

Trifolium pratense
    Erysiphe polygoni, 82.
    Gloeosporium caulivorum, 87.
    Phyllachora trifolii, 84.
    Pseudopeziza trifolii, 83.
    Sclerotinia trifoliorum, 83.
    Uromyces trifolii fallens, 100.

Trifolium repens
    Uromyces trifolii trifolii-repentis, 100.

Trifolium sp.
    Phyllachora trifolii, 84.

Trillium ovatum
    Urocystis trillii, 91.

Triticum aestivum
    Bacterium translucens undulosum, 80.
    Cercosporella herpotrichoides, 88.
    Erysiphe graminis, 81.
    Ophiobolus graminis, 85.
    Puccinia glumarum, 96.
    Puccinia graminis tritici, 96.
    Puccinia rubigo-vera tritici, 99.
    Septoria tritici, 86.
    Tilletia laevis, 91.
    Tilletia tritici, 91.
    Typhula graminum, 100.
    Ustilago tritici, 91.

Triticum compactum
    Puccinia glumarum, 96.
    Puccinia rubigo-vera tritici, 99.

Tulipa sp. (cult.)
    Botrytis tulipae, 87.

Urtica dioica
    Puccinia caricis urticata, 94.

Vaccinium macrophyllum
Pucciniastrum myrtilli, 92.

Vaccinium sp.
Pucciniastrum goeppertianum, 92.

Veratrum californicum
Cylindrosporium veratrinum, 87.

Vicia americana
Ovularia viciae, 88.

Viola adunca
Puccinia violae, 99.

Viola canadensis
Puccinia violae, 99.

Viola glabella
Puccinia violae, 99
Septoria hyalina, 85.

Viola sp.
Puccinia violae, 99.

Viorna hirsutissima
Puccinia rubigo-vera agropyri, 98.

Vitis sp. (cult. grape)
Bacterium tumefaciens, 80.

Xanthium speciosum
Puccinia xanthii, 99.

Zygadenus venenosus
Uromyces zygadeni, 100.

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,18

THE PLANT DISEASE REPORTER

Issued By

Division of Mycology and Disease Survey

Supplement 96

Diseases of Plants in the United States in 1935

December 31, 1936

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

DISEASES OF PLANTS IN THE UNITED STATES IN 1935

Compiled by

H. A. Edson, Principal Pathologist in Charge,
and Jessie I. Wood, Assistant Pathologist,
Division of Mycology and Disease Survey.

Plant Disease Reporter
Supplement 96

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CONTENTS

	Page
List of Collaborators..............................	116
Introduction.......................................	120
Weather Data.......................................	121
Diseases of Cereal Crops...........................	131
Diseases of Forage and Cover Crops.................	149
Diseases of Fruit Crops............................	159
Diseases of Nut Crops..............................	186
Diseases of Vegetable Crops........................	189
Diseases of Special Crops..........................	233
Diseases of Sugar Crops............................	239
Diseases of Trees..................................	240
Diseases of Ornamental and Miscellaneous Plants.	260

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PUERTO RICO, Insular Experiment Station, Rio Piedras - M. T. Cook.

I N T R O D U C T I O N

The arrangement of the report for 1935 is somewhat different from that of preceding summaries. Under the various crop groups the hosts are listed alphabetically according to their scientific names. Under the hosts the diseases are listed, also alphabetically, in the following order: fungous, bacterial, nematode, virus, and non-parasitic.

The index, which will include all the Supplements issued during 1936, will appear separately as Supplement 97.

Except for arrangement, the material is presented in practically the same way as in other recent summaries, although direct quotation has been used more frequently. Only reports received by the Survey during the year from collaborators and other pathologists are included, no attempt having been made to review the literature. Reports already given in full in the Reporter are only briefly referred to here. Volume XIX and the earlier issues of Volume XX of the Reporter should be consulted in connection with this summary; also Supplements 91, 92, and 93, in which the extraordinary wheat stem rust outbreak is discussed. In addition, G. B. Ramsey has prepared a report on fruit and vegetable diseases observed on the Chicago market in 1935 which will be issued soon as Supplement 98.

Weather during the year has been discussed rather fully in various issues of the Reporter and in this summary general presentation of weather data is confined to the maps (Figures 1-8) showing departures from normal temperature and percentages of normal rainfall for the four seasons, by States, and the graphs (Figures 9-20) showing accumulated temperature and rainfall for the year at six stations selected as representative of conditions in various sections of the country.

The Survey wishes to thank the official collaborators named in the foregoing list, pages 116 to 119, and the many individual contributors not holding official appointments, without whose continued cooperation these yearly summaries would not be possible. Thanks are also due to pathologists and other members of the Bureau of Plant Industry, of whom some have read this summary and made valuable suggestions and additions, and others have contributed many reports during the year.

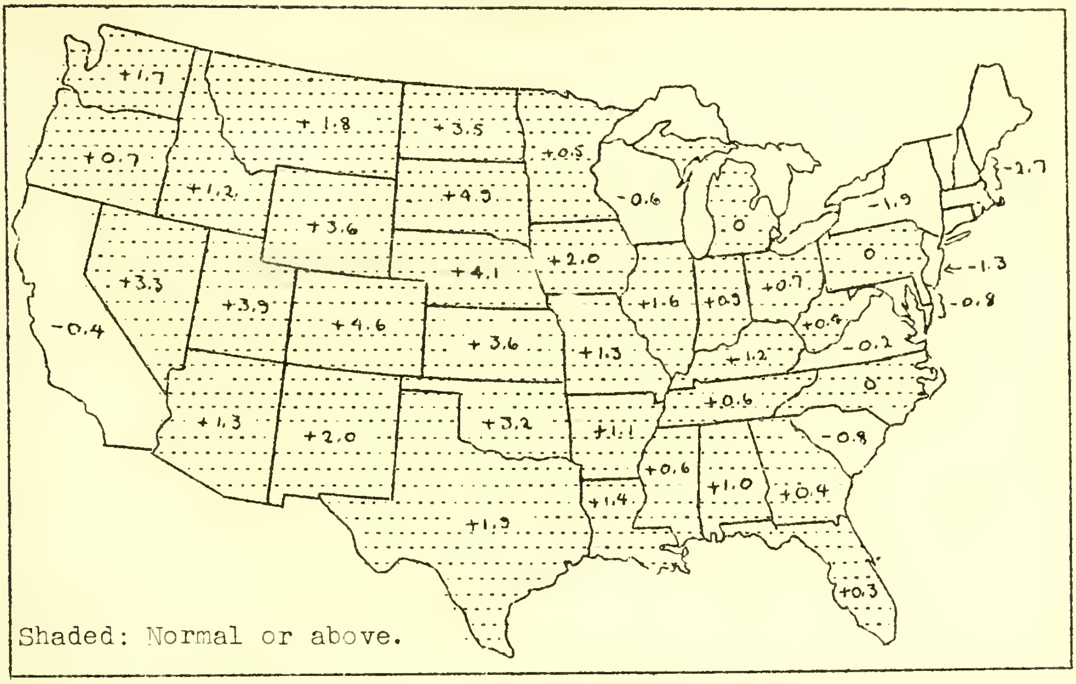

Fig. 1. Departure from the normal temperature for the winter, December 1934 to February 1935, inclusive.

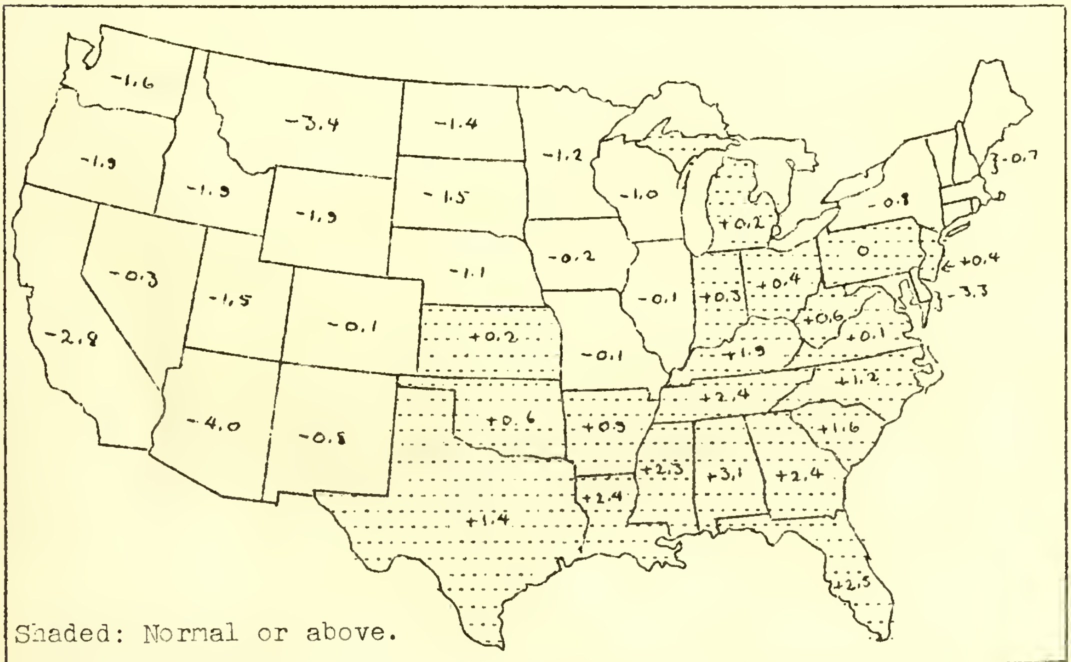

Fig. 2. Departure from the normal temperature for the spring, 1935, March to May, inclusive.

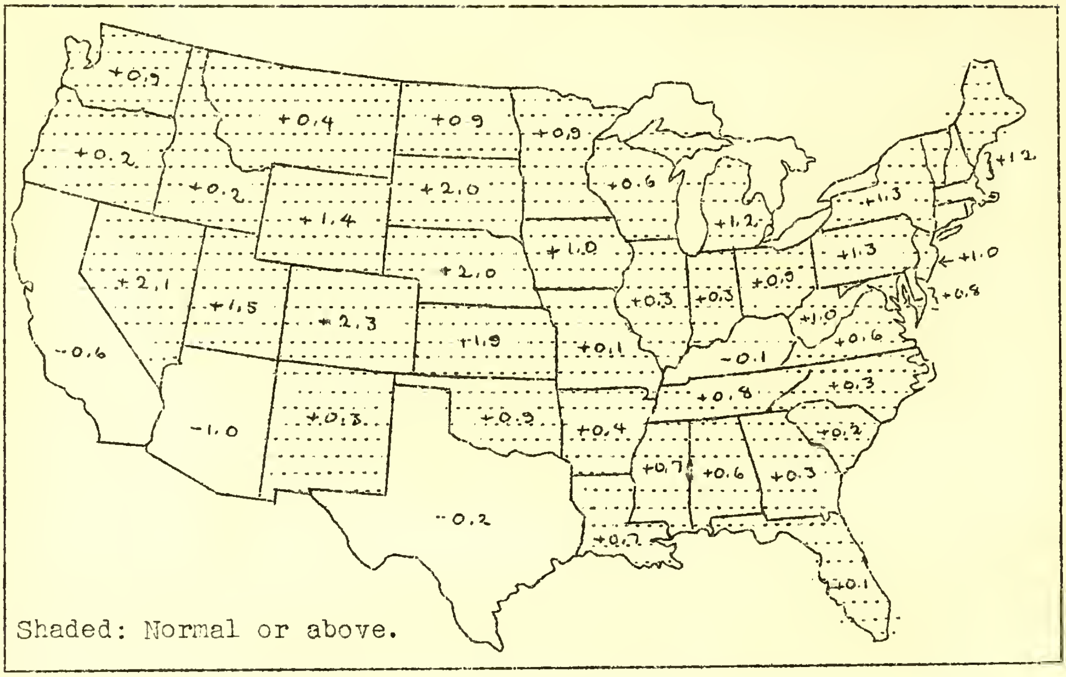

Fig. 3. Departure from the normal temperature for the summer, 1935, June to August, inclusive.

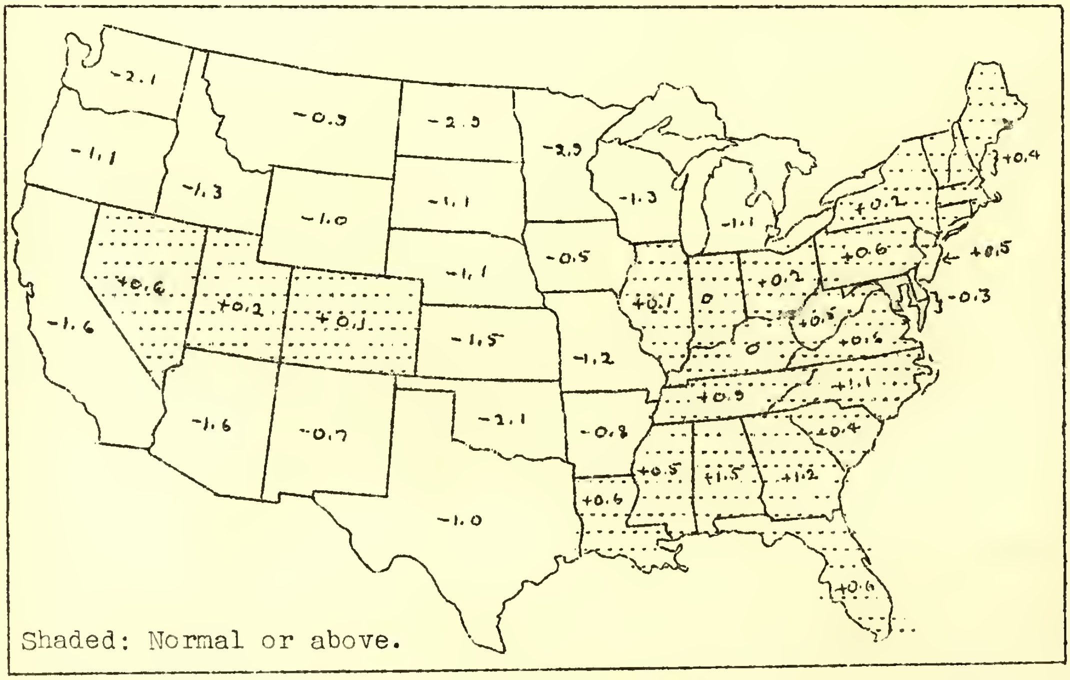

Fig. 4. Departure from the normal temperature for the autumn of 1935, September to November, inclusive.

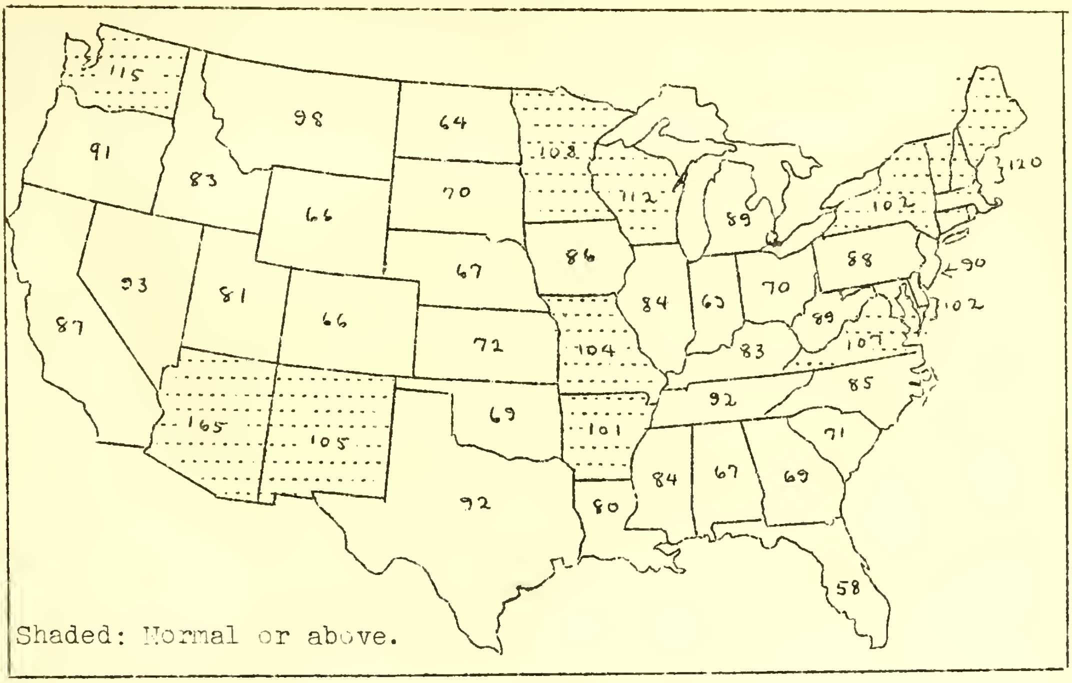

Fig. 5. Percentage of normal precipitation for the winter, December 1934 to February 1935, inclusive.

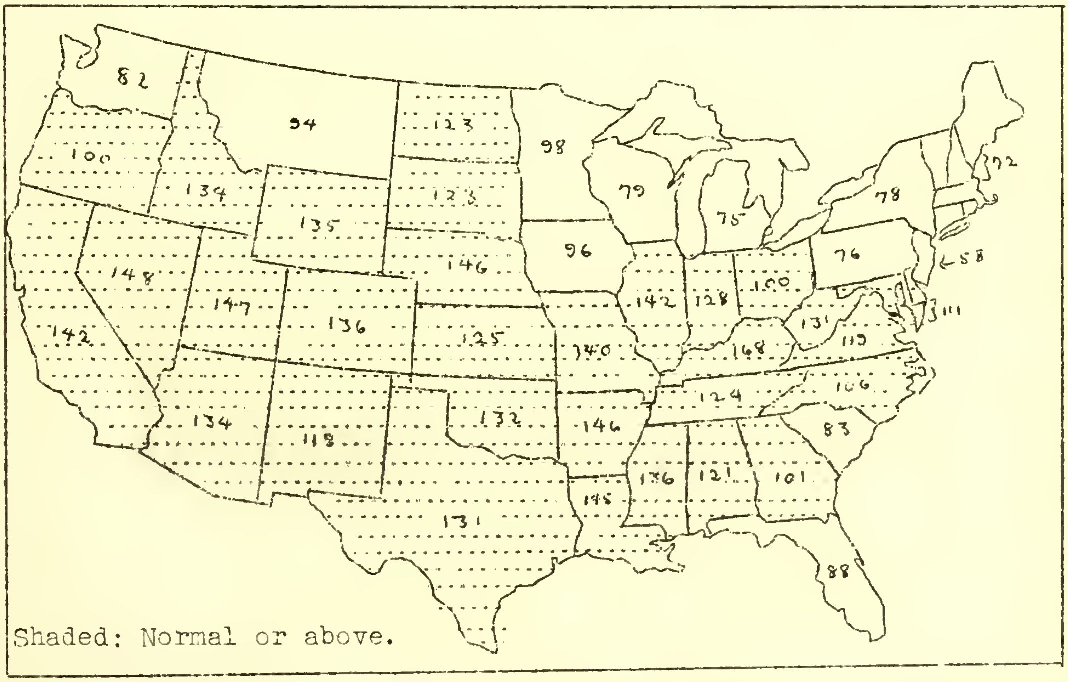

Fig. 6. Percentage of normal precipitation for the spring, March to May, 1935, inclusive.

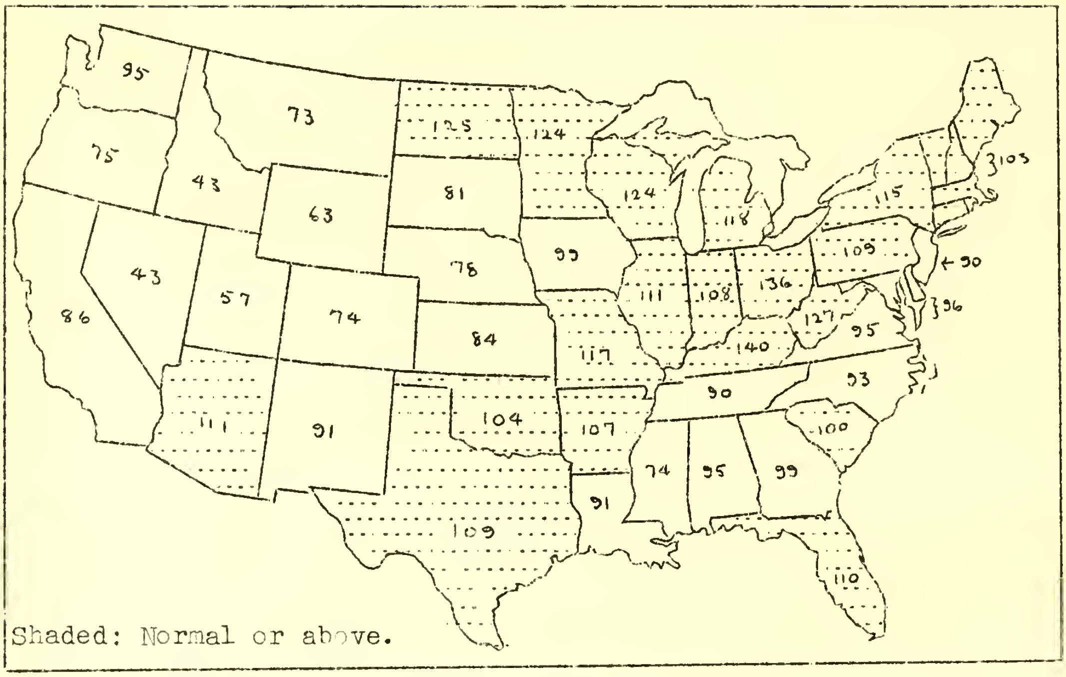

Fig. 7. Percentage of normal precipitation for the summer, June to August, 1935, inclusive.

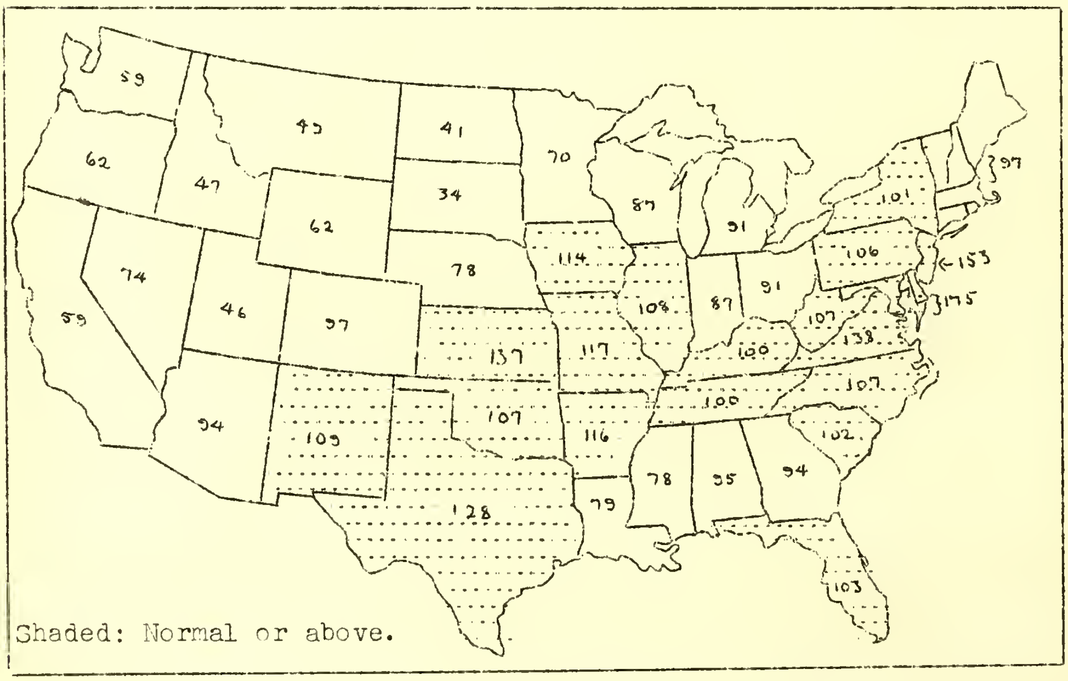

Fig. 8. Percentage of normal precipitation for the autumn, September to November, 1935, inclusive.

HARRISBURG, PENNSYLVANIA.

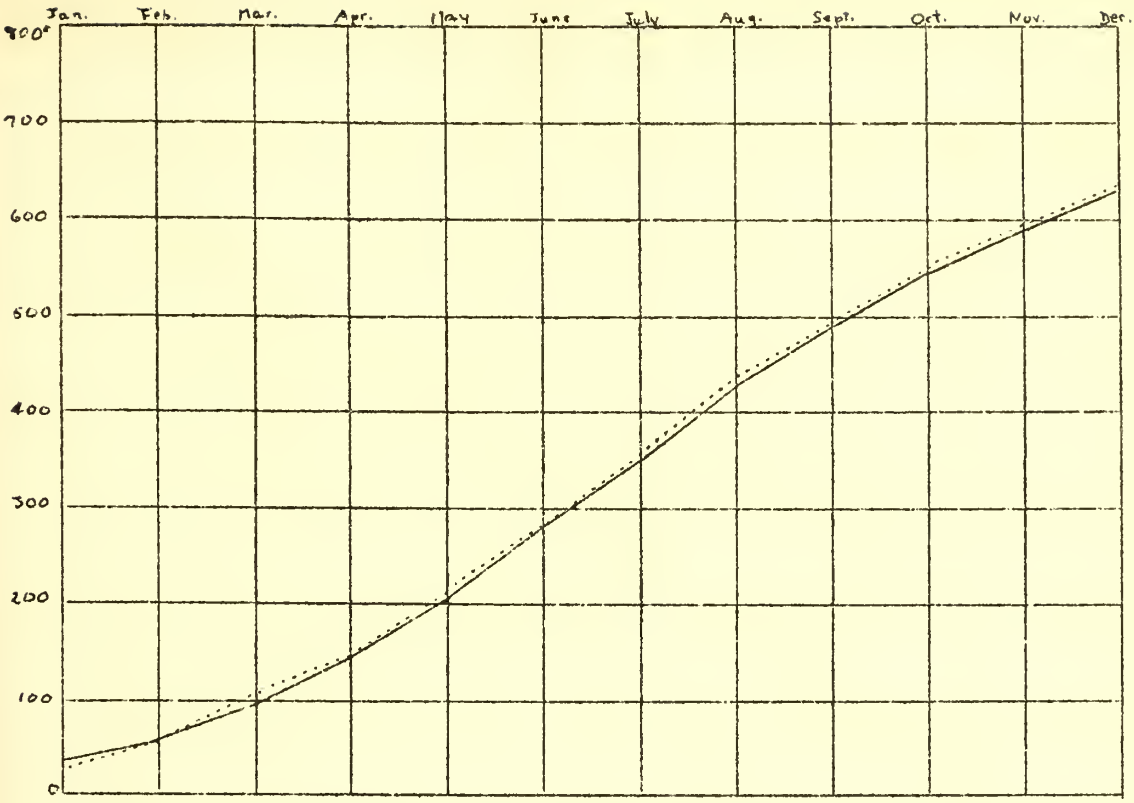

Fig. 9. Accumulated temperature in degrees F. for Harrisburg, Pennsylvania, 1935 (dotted line), compared with normal (solid line).

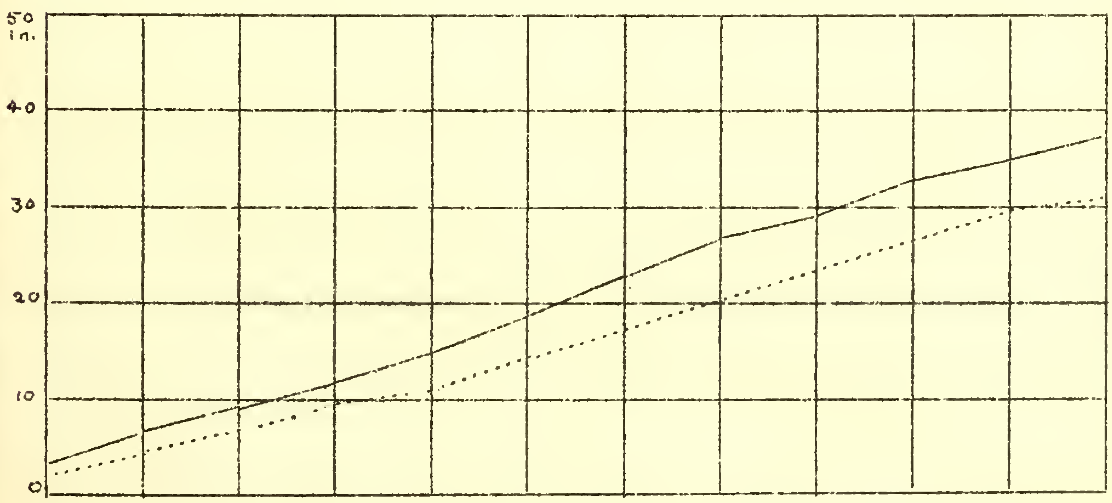

Fig. 10. Accumulated precipitation in inches for Harrisburg, Pennsylvania, 1935 (dotted line), compared with normal (solid line).

ATLANTA, GEORGIA.

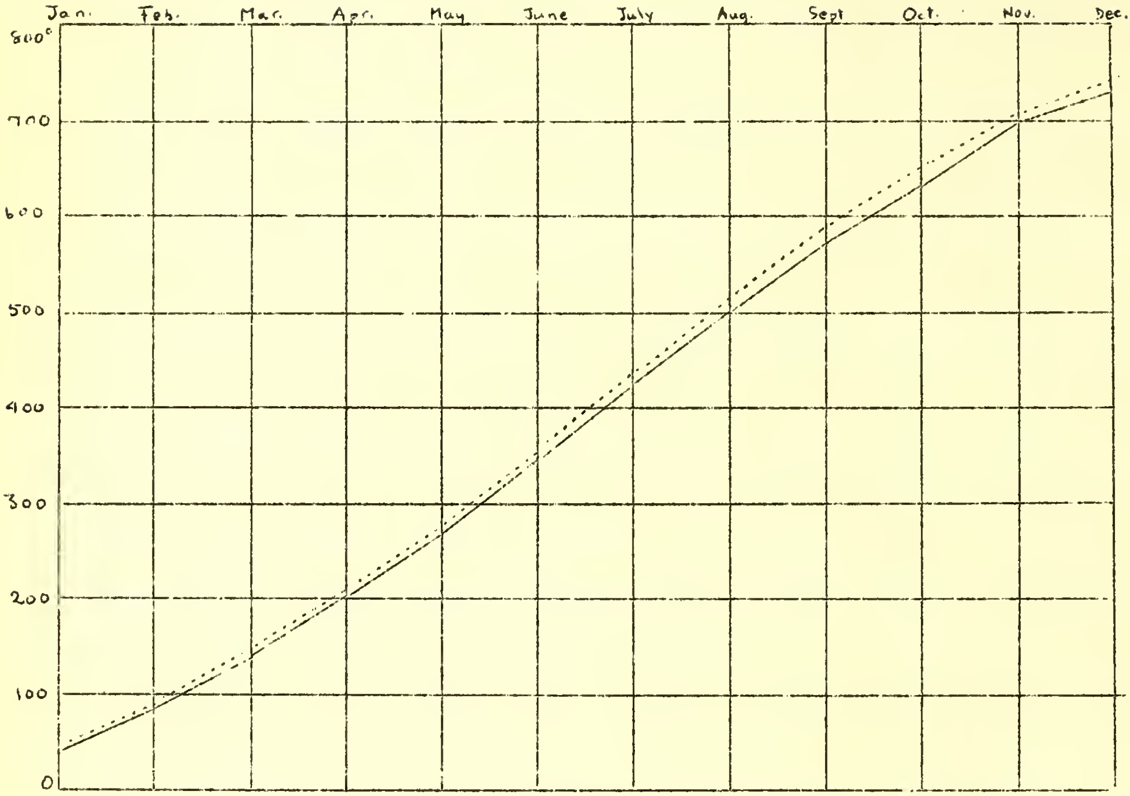

Fig. 11. Accumulated temperature in degrees F. for Atlanta, Georgia, 1935 (dotted line), compared with normal, (solid line).

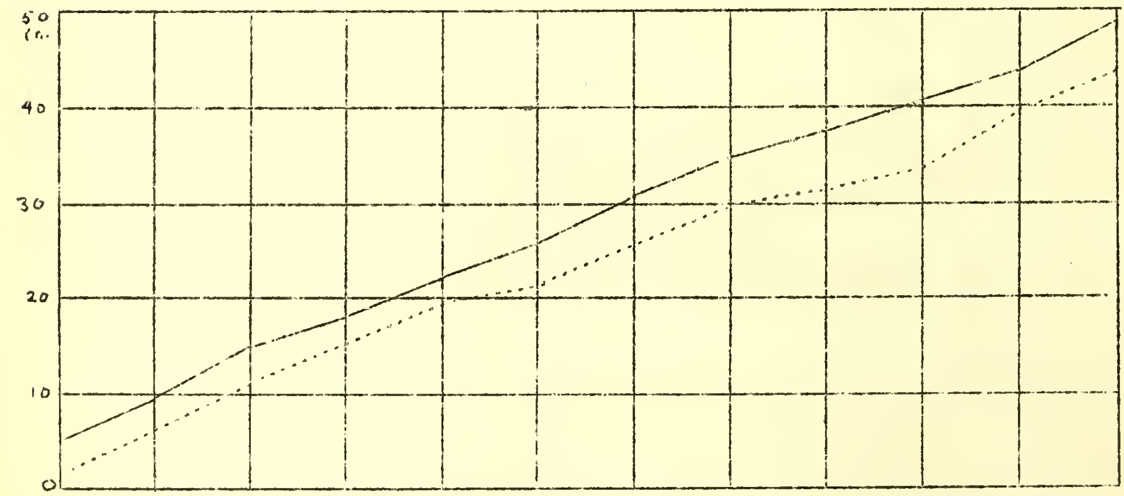

Fig. 12. Accumulated precipitation in inches for Atlanta, Georgia, 1935 (dotted line), compared with normal, (solid line).

BISMARCK, NORTH DAKOTA.

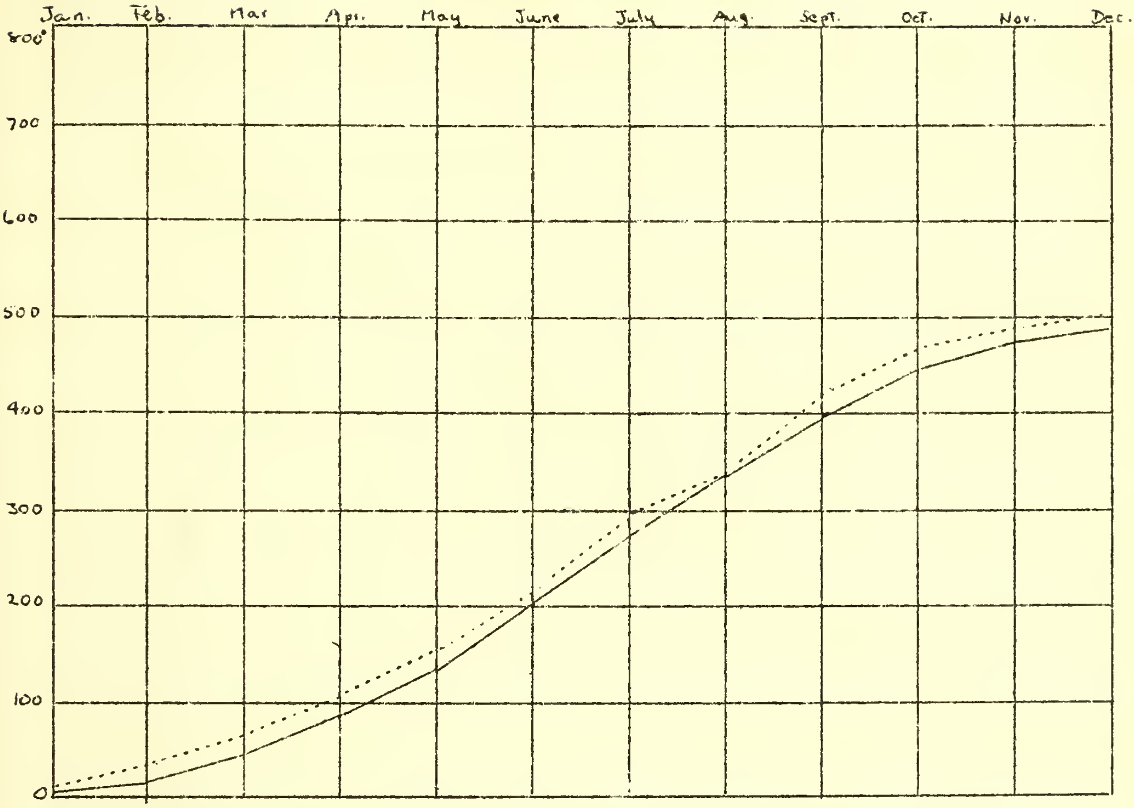

Fig. 13. Accumulated temperature in degrees F. for Bismarck, North Dakota, 1935 (dotted line), compared with normal (solid line).

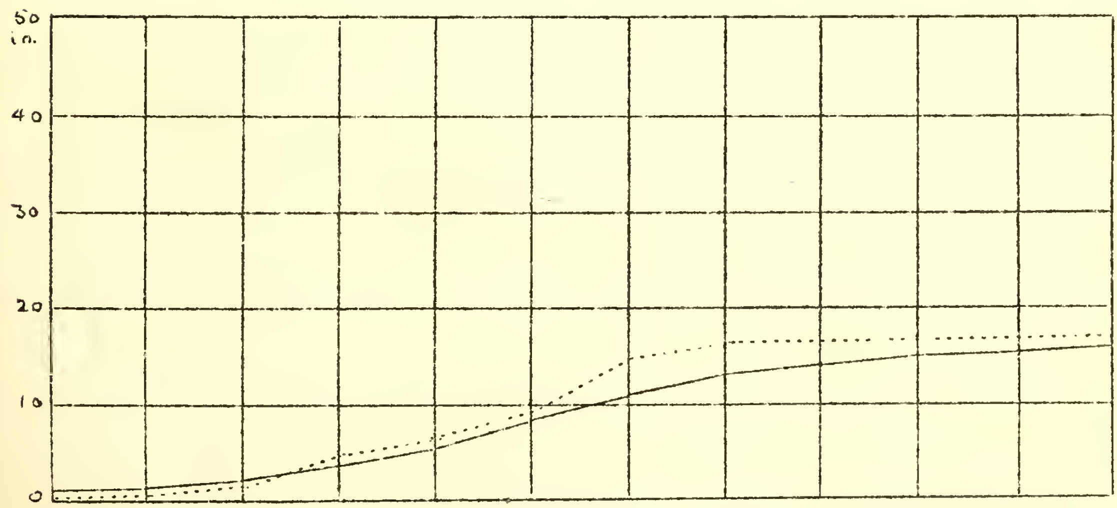

Fig. 14. Accumulated precipitation in inches for Bismarck, North Dakota, 1935 (dotted line), compared with normal (solid line).

LITTLE ROCK, ARKANSAS.

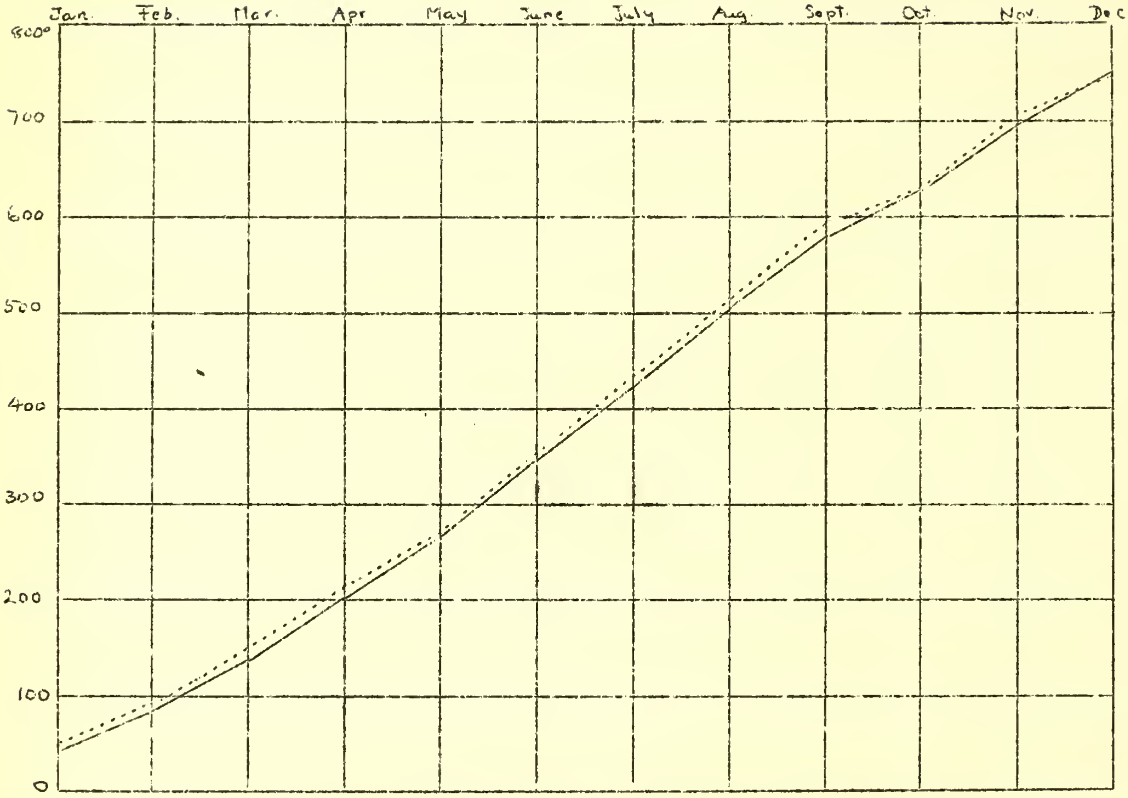

Fig. 15. Accumulated temperature in degrees F. for Little Rock Arkansas, 1935 (dotted line), compared with normal (solid line).

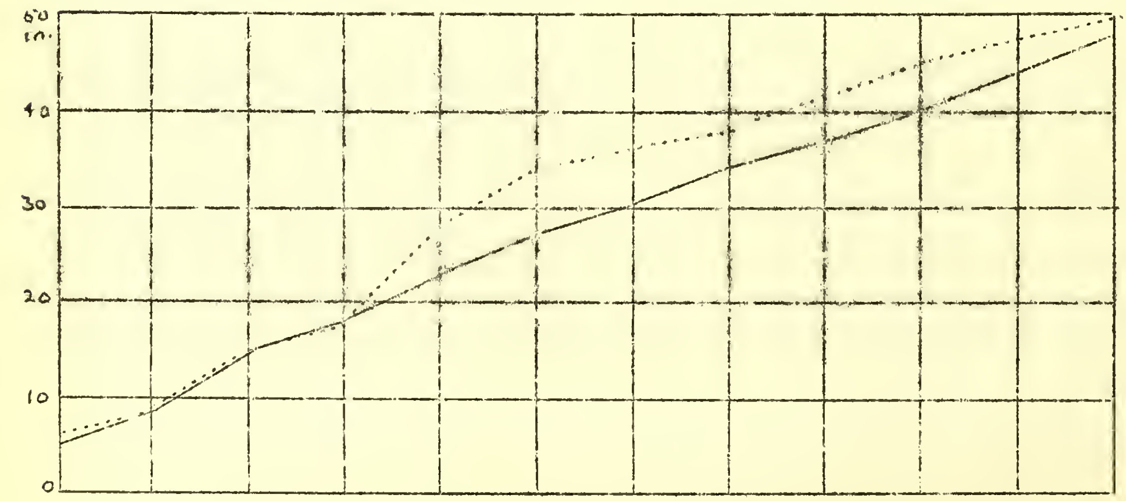

Fig. 16. Accumulated precipitation in inches for Little Rock Arkansas, 1935 (dotted line), compared with normal (solid line).

PORTLAND, OREGON.

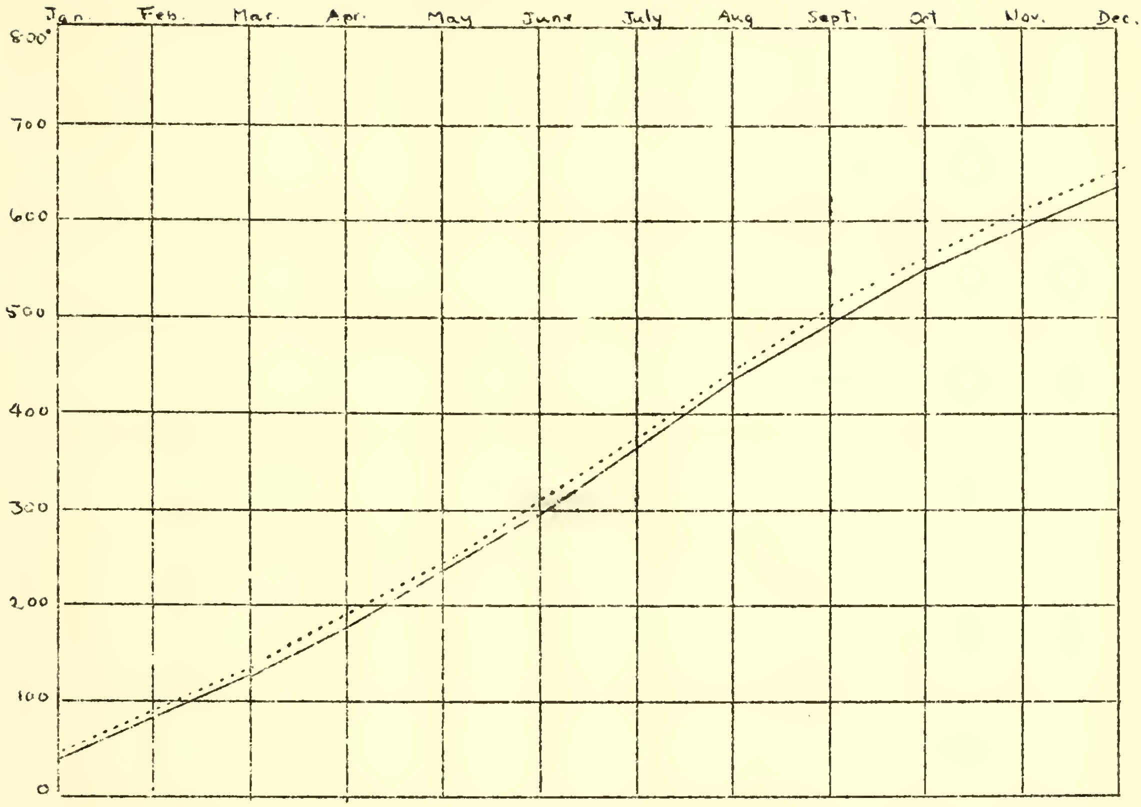

Fig. 17. Accumulated temperature in degrees F. for Portland, Oregon, 1935 (dotted line), compared with normal (solid line).

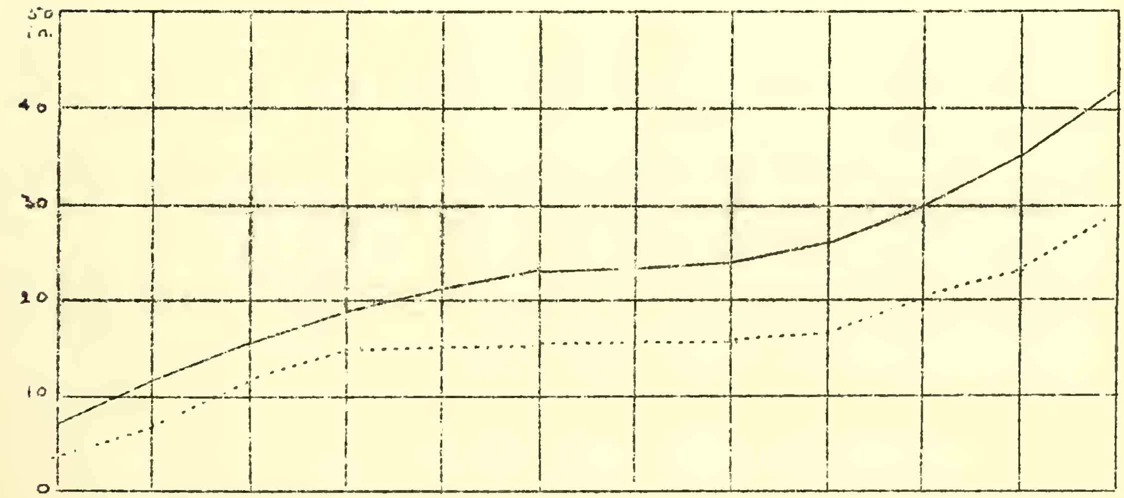

Fig. 18. Accumulated precipitation in inches for Portland, Oregon, 1934 (dotted line), compared with normal (solid line).

SACRAMENTO, CALIFORNIA.

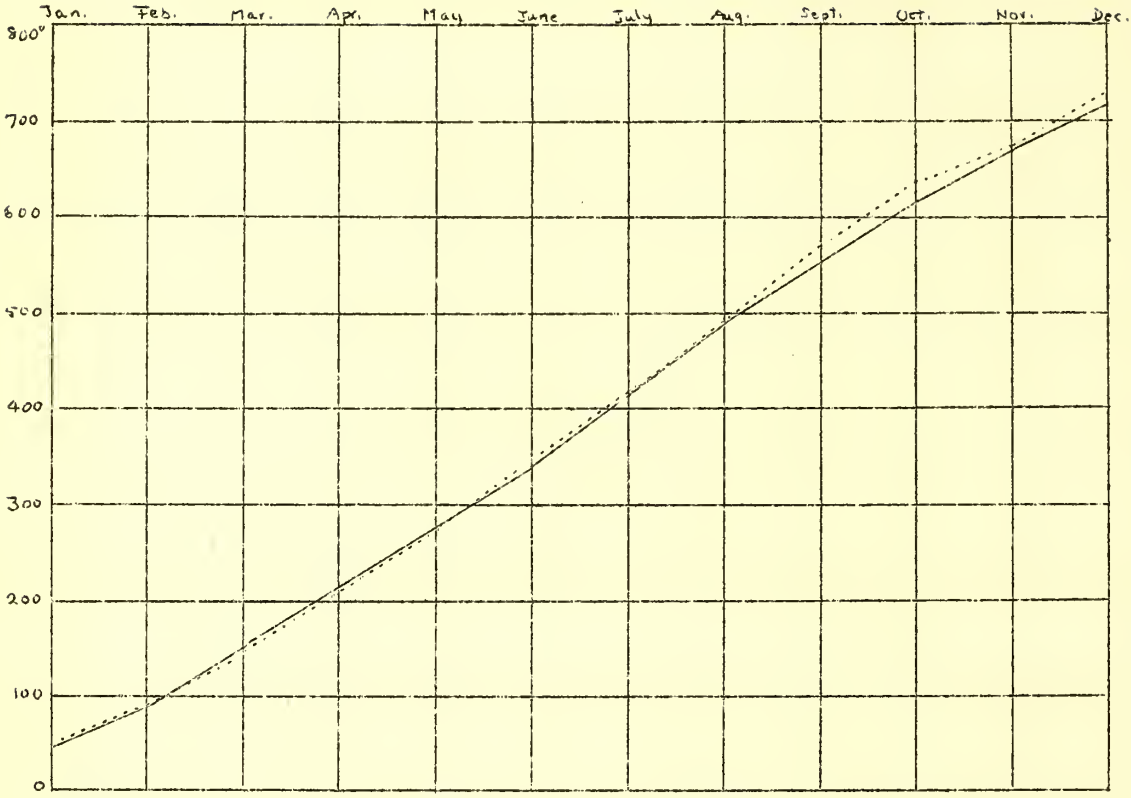

Fig. 19. Accumulated temperature in degrees F. for Sacramento, California, 1935 (dotted line) compared with normal (solid line).

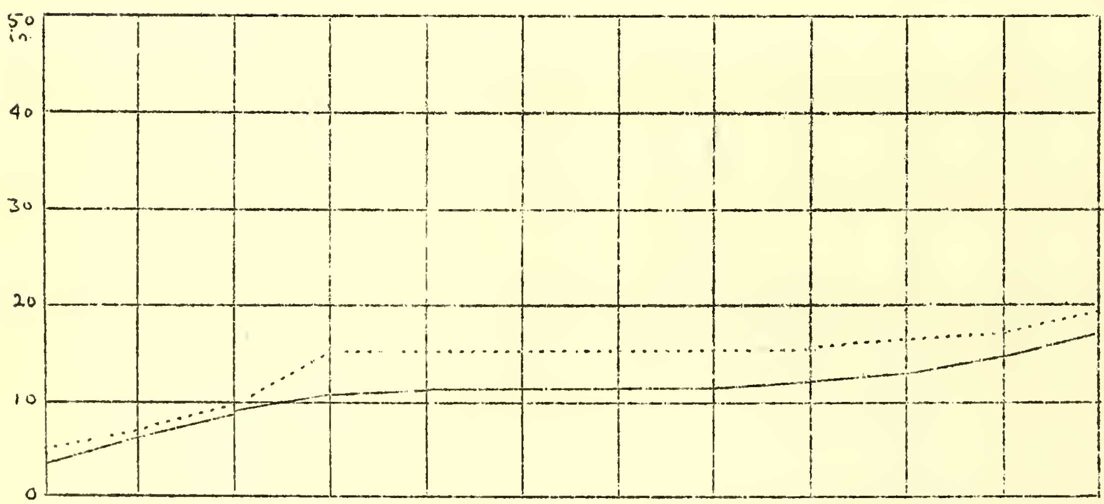

Fig. 20. Accumulated precipitation in inches for Sacramento, California, 1935 (dotted line), compared with normal (solid line).

D I S E A S E S O F C E R E A L C R O P S

A V E N A S A T I V A. O A T S

FOOT ROT (Fusarium spp. and Helminthosporium sp.). Michigan reported traces of injury from foot rot attributed to organisms of both genera. Foot rots were also the cause of some loss in Oregon.

SCAB (Gibberella saubinetii) occurred in about average prevalence in New Jersey, Maryland, Ohio, Illinois, and Wisconsin. It was more prevalent than usual in Minnesota. Losses did not exceed a trace.

LEAF SPOT (Helminthosporium avenae) appeared in Virginia, Illinois, Michigan, Iowa, and Oregon. Losses were negligible.

FOOT ROT (Helminthosporium sp.). See Foot rot, Fusarium spp.

CROWN RUST (Puccinia coronata) was generally more prevalent or much more prevalent than in 1934 or in an average year. Estimated losses varied from a trace to 50 percent as follows: Massachusetts and Oregon, each a trace; Pennsylvania and Ohio, each 0.5; Virginia, West Virginia, Georgia, and Minnesota, each 1; Maryland, Texas, and South Dakota, each 2; New York and Kansas, each 4; Tennessee, South Carolina, Illinois, and North Dakota, each 5; Wisconsin, 8; Missouri, 13 of which 3 was attributed to loss in grade; Indiana and Iowa, each 20; Arkansas, 50; North Carolina reported severe injury on the late summer crop but no serious damage to early-sown fields. According to Vaughan, crown rust was very severe on late planted fields in Wisconsin of which there were many due to the wet May. In such fields the injury ran as high as 20 percent. C. O. Johnston stated that infection was heavy throughout the eastern half of Kansas. A severe epiphytotic developed in late June, and as the crop also was late due to the early spring drought considerable injury resulted. Late maturity of the crop was a factor leading to severe injury in Texas also.

STEM RUST (Puccinia graminis avenae). While twenty-three states reported incidence of stem rust of oats, the losses were relatively light, even in the area where grain rusts were serious on later maturing crops. Loss estimates were: Pennsylvania, Maryland, West Virginia, Illinois, Michigan, Wisconsin, South Dakota, Wyoming, and Oregon, each a trace; Arkansas, 0.8 percent; South Carolina, Ohio, Minnesota, and Iowa, each 1; Virginia and Missouri, 1.5; Kansas, 2; Massachusetts, 3; North Dakota, 5; Texas, 10. Connecticut and New Jersey also reported its occurrence. In Kansas, according to C. O. Johnston, the disease was most severe in the vicinity of Manhattan. It was not serious over the State as a whole except in the northeast section.

SMUT (Ustilago avenae and U. levis). Due to weather conditions favoring the development of smut diseases and relaxation of seed treatment, prevalence was again high and above the average generally, though Louisiana, Wisconsin, Minnesota, and Missouri reported less than in 1934. Estimated losses follow: Oregon, 0.2 percent; Indiana, Iowa, and North Dakota, each 1; Michigan, 1.5; Georgia and South Dakota, each 2; Illinois, 2.6: Minnesota and Wyoming, each 3; Virginia, 3; Kansas, 4; West Virginia, Texas, Ohio, Wisconsin, and Montana, each 5; Maryland, 6; Missouri, 7; New York, 9.5; Massachusetts, Tennessee, and South Carolina, each 10; Pennsylvania, 15. New Jersey, Delaware, North Carolina, Louisiana, Arkansas, and Washington also reported its incidence. New York reported counts showing 18 percent smut in untreated fields and about 1 percent in treated fields. Only about one-half the fields were treated. It was also found that growers either injure their seed by over-treating or treat only superficially. South Carolina and Wisconsin both reported general neglect of seed treatment since the depression with consequent increase in losses from smut. Little seed was treated in Arkansas where counts showed from less than 1 to nearly 50 percent infection. Oat smut was common throughout New Jersey and general in practically all untreated fields in Pennsylvania. The disease was said to be of little consequence in North Carolina in 1935.

HALO BLIGHT (Bacterium coronafaciens) was observed in New York, Iowa, Illinois, Minnesota, and Kansas. It was rather general in New York, especially on the newer varieties which are more susceptible than the Swedish Select. The loss ranged from 0.5 to 1 percent. Iowa estimated 5 percent reduction in yield. Practically no losses occurred in Illinois or Minnesota. The average prevalence in fields examined in Illinois was 2.67 percent.

BLAST (cause undetermined) occurred in Pennsylvania, Illinois, Iowa, and North Dakota. It was prevalent in fields in Illinois to the extent of 83.8 percent and caused an estimated loss of 10 percent. Pennsylvania and Iowa each estimated 3 percent loss and North Dakota a trace.

MISCELLANEOUS TROUBLES. A sheath and leaf spot, of undetermined cause was rather important on certain varieties of oats in Arkansas. Kansas reported the presence of a blade blight of undetermined cause in experimental sowings at Manhattan, and also a physiological trouble, possibly the same as the "grey speck", which has been associated with manganese deficiency. Chlorosis, attributed to excess of lime, occasioned an estimated loss of 0.1 percent in Texas. A "red tip" trouble observed in Pierce County, Washington, was classified as frost injury.

BARLEY. See HORDEUM VULGARE

BUCKWHEAT. See FAGOPYRUM ESCULENTUM

CORN, FIELD. See ZEA MAYS

CORN, SWEET. See ZEA MAYS

F A G O P Y R U M E S C U L E N T U M. B U C K W H E A T

POWDERY MILDEW (Erysiphe polygoni) was reported from Alameda County, California, by C. E. Yarwood.

MALNUTRITION (insufficient fertilization) accounted for some poor fields in New Jersey.

FLAX. See LINUM USITATISSIMUM

H O R D E U M V U L G A R E. B A R L E Y

BLIGHT (Alternaria sp.). See Scab (Gibberella saubinetii).

ERGOT (Claviceps purpurea) was observed on barley in New York (only one infected head found), Ohio (0.1 percent), Michigan (a few heads in the upper peninsula only), Wisconsin (trace), Minnesota (trace, maximum incidence in a single field 17 percent of the heads), and North Dakota (0.5 percent). Both Minnesota and Wisconsin reported more than the usual prevalence. Maryland and Illinois each stated that no infected heads were seen.

POWDERY MILDEW (Erysiphe graminis) was reported from Maryland, Virginia, Georgia, Tennessee, Texas, Illinois, Wisconsin, Minnesota, and North Dakota. This appears to be the first report of barley mildew from North Dakota. No serious losses were estimated but it was more prevalent than usual in Minnesota.

ROOT ROT (Fusarium sp.). See Root rot (Helminthosporium spp.), and Scab (Gibberella saubinetii).

SCAB (Gibberella saubinetii) was generally more prevalent than in an average year or in 1934. Losses were estimated as follows: Massachusetts and New Jersey, each a trace; Michigan, 0.2 percent; Virginia, 1; Wisconsin, 1.5; Maryland and Ohio, each 2; Missouri and South Dakota, each 3; New York, 3 to 5. Minnesota estimated a loss of 7 percent due to the combined effect of scab and blight. Helminthosporium spp. and Alternaria in the northern part of the State and Fusarium spp. in the southern part were the chief contributory organisms.

STRIPE (Helminthosporium gramineum) occurred generally with the usual or slightly increased prevalence in most of the states reporting but in Pennsylvania it was less severe than usual. Massachusetts, New York, Pennsylvania, Maryland, Virginia, West Virginia, Tennessee, South Carolina, Georgia, Illinois, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Montana, Wyoming, Oregon, and California reported the disease. Losses were estimated as follows: Massachusetts, South

Carolina, Missouri, and Oregon, each a trace; Pennsylvania, 0.1 percent; North Dakota, 0.2; Maryland and Illinois, each 0.5; New York, 0.5 to 1; West Virginia, Tennessee, Wisconsin, Minnesota, Iowa, Montana, and Wyoming, each 1; South Dakota, 2.

SPOT BLOTCH (Helminthosporium sativum). Wisconsin reported more and Missouri much more spot blotch than in 1934 or in an average year. Other states giving comparative estimates reported the same or less. Both Massachusetts and Illinois stated the disease was not observed in 1935. Prevalence and injury were reported as follows: Texas, present; Michigan, Minnesota, Iowa, and North Dakota, each a trace; Pennsylvania and Oregon, each 0.1 percent; Virginia, Missouri, and South Dakota, each 1; Wisconsin, 1.5. In Pennsylvania the disease occurred in 99 percent of the untreated fields with a maximum injury of 20 percent; in Wisconsin and Minnesota part of the estimated losses were due to H. teres; and in Missouri most of the injury occurred in the fall on barley grown for pasturage.

ROOT ROT (Helminthosporium spp., Fusarium spp., Septoria sp., Various organisms). Septoria and Helminthosporium were each regarded as the cause of 0.5 percent loss in Texas. Minnesota mentioned Helminthosporium and Fusarium as concerned in traces of loss, while damage from various foot rots in Oregon was set at 1.5 percent.

LEAF RUST (Puccinia anomala). Incidence and estimated injury were reported as follows: Maryland, 0.5 percent; Virginia, severe; Tennessee, 7; Ohio, 1; Michigan (ten specimens seen); Wisconsin, 1; Minnesota, trace of loss for the State but a maximum incidence of 75 percent in any one field; Missouri, 5 percent reduction in yield and 1 percent additional loss in grade.

STEM RUST (Puccinia graminis tritici) was recorded with percentage losses when estimated, as follows: Massachusetts, 5; New Jersey, severe at College Farm; Maryland, trace; Virginia, 1; Missouri, trace; Ohio, 2; Illinois, 0.5; Michigan, Oregon, and Wisconsin, trace; Minnesota and North Dakota, 15; Iowa, 10; South Dakota, 8; Wyoming, 5.

NET BLOTCH (Pyrenophora teres) was reported from Illinois, Michigan, Wisconsin, Minnesota, and North Dakota. In no case did the injury exceed 1 percent.

SCALD (Rhyncosporium secalis) occurred in Wisconsin, Minnesota, Oregon, and California. Loss in Oregon was estimated at 3 percent.

ROOT ROT (Septoria sp.). See Root rot (Helminthosporium spp.).

COVERED SMUT (Ustilago hordei) was reported from twenty-four states with losses as follows: Massachusetts and New Jersey, each a trace; Oregon, 0.1 percent; Michigan, 0.2; Illinois, Wisconsin, and Iowa, each 0.5;

North Carolina, Georgia, Ohio, North Dakota, and South Dakota, each 1; Minnesota, 1.5; Virginia and Montana, each 2; West Virginia and Wyoming, each 3; Maryland, 4; Arkansas and Missouri, each 5; New York, 6.5 (including *U. nuda*); Tennessee, 7; Pennsylvania, 8.4; Kansas, 10. Maryland and Michigan reported less covered smut than in average years, other states reporting estimated the usual incidence or more. It was of great concern in Kansas. All the barley in the State (winter and spring) was badly smutted. The losses ran as high as 40 percent in some fields.

LOOSE SMUT (*Ustilago nuda* and *U. nigra*). Losses from loose smut were estimated as follows: Massachusetts and Wyoming, each a trace; Michigan, 0.2 percent; Iowa and North Dakota, each 0.5; Maryland, Texas, Ohio, Minnesota (including *U. medians*), and Montana, each 1; West Virginia, Tennessee, and Kansas, each 2; Virginia and Wisconsin, each 3; Illinois, 3.2; Pennsylvania, 3.4; Georgia and South Dakota, each 4; Missouri, 9. It was also present in New Jersey (severe on some plantings) and in Arkansas where it occurred generally in small amounts. Contrary to usual experience loose smut was more prevalent in Georgia in 1935 than covered smut.

BACTERIAL BLIGHT (*Bacterium translucens*) was reported as causing 1 percent injury in Texas and as present locally without appreciable injury in Minnesota.

LINUM USITATISSIMUM. FLAX

ANTHRACNOSE (*Colletotrichum linicola*) was observed as a leaf spot in Minnesota but caused practically no damage.

SEEDLING BLIGHT (*Fusarium* sp.). See Root rot (*Rhizoctonia* sp.).

WILT (*Fusarium lini*). The very general use of resistant varieties has reduced the injury caused by this disease but when susceptible varieties are planted in the old flax producing areas losses are very heavy. It was reported in the usual prevalence or less from Wisconsin, Minnesota (2 percent reduction in yield plus 1 percent injury in quality);Iowa and North Dakota, each 1. The cool wet spring retarded the development of wilt in the early season but it was favored in mid-summer by the dry weather and heat. Minnesota and North Dakota each reported maximum losses in any one field of 50 percent. In California, G. L. Stout stated that, "all flax districts covering 50,000 acres were surveyed in 1935 and no wilt found. (State Department of Agriculture). Low temperature during flax growing season may account for absence of wilt."

HELMINTHOSPORIUM (*Helminthosporium* sp.) was observed in two fields in Minnesota.

RUST (Melampsora lini) was reported from Wisconsin, Minnesota, Iowa, and North Dakota. Losses varied from a trace to 1 percent. Oregon and California each reported the absence of rust in 1935.

PASMO (Phlyctaena linicola) appeared in scattered localities in Wisconsin and generally distributed in Minnesota with only traces of loss. The California survey by the State Department of Agriculture failed to find the disease present.

BROWNING (Polyspora lini) was more prevalent than last year or in average years but injury was estimated not to exceed from a trace to 0.5 percent. It was observed in Minnesota, Iowa, and North Dakota.

DAMPING OFF (Pythium debaryanum) was reported as the cause of 20 percent seedling loss in Iowa. See also Root rot (Rhizoctonia sp.).

ROOT ROT (Rhizoctonia sp. and undetermined). Rhizoctonia root rot caused a trace of loss in Minnesota. Troubles referred to as root rot and blight were observed in Minnesota and Iowa but microscopical examination did not satisfactorily reveal the cause. It was suggested that Fusarium, Rhizoctonia, or Pythium may have been involved.

SEEDLING BLIGHT (Rhizoctonia sp.) caused traces of injury in Minnesota and Iowa. See also Root rot (Rhizoctonia sp.).

STEM ROT (Sclerotinia sclerotiorum) was reported from Santa Cruz County in California.

CHLOROSIS (non parasitic) was observed locally in Minnesota but apparently caused no loss.

HEAT CANKER (non parasitic). A trace of loss was reported from Minnesota and 0.2 percent from North Dakota. More serious injury from sun burning was reported from Oregon where as many as 50 percent of the plants in some fields had the growing point killed.

OATS. See AVENA SATIVA

ORYZA SATIVA. RICE

LEAF SPOT (Helminthosporium oryzae) occurred to a limited extent locally in Mississippi and Louisiana, where it was less prevalent than usual. It was abundant in the vicinity of Beaumont, Texas, and was also reported from Puerto Rico.

BLACK KERNEL (Helminthosporium oryzae and H. curvulum). Each of the two organisms was reported as the cause of 3 percent black kernel in Texas.

STEM ROT (Leptosphaeria salvini) caused 10 percent loss in Arkansas. The infection was particularly severe on the Early Prolific variety in many areas. Supreme Blue Rose escaped severe infection. The short grain types in general are said to be very resistant.

FOOT ROT (Ophiobolus sp.) occurred in about the usual prevalence in Arkansas.

BLAST (Piricularia oryzae) was reported as causing 1 percent loss in Texas.

STEM ROT (Sclerotium oryzae) caused unimportant losses in Louisiana and Texas.

SMUT (Tilletia horrida). No reports of this disease were received for 1935. Arkansas stated that it was not observed.

LEAF SMUT (Entyloma oryzae). One collection of this disease was made near Crowley, Louisiana, and specimens were observed at Beaumont, Texas.

LEAF and GLUME SPOTTING (undetermined). This trouble was more than ordinarily prevalent and generally distributed in Arkansas.

STRAIGHT HEAD (undetermined). Reported from Texas and from Arkansas where it is of importance only on new areas where rice is sown in virgin soil.

WHITE TIP (undetermined) was prevalent particularly on Blue Rose variety in Texas and Louisiana.

RICE. See ORYZA SATIVA

RYE. See SECALE CEREALE

SECALE CEREALE. RYE

ERGOT (Claviceps purpurea). The following fifteen states reported observations of ergot: Massachusetts, New Jersey, Virginia, West Virginia, Tennessee, Ohio, Illinois, Michigan, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Montana, and Oregon. Losses were estimated at a trace except as follows: Massachusetts, 2 percent; Iowa, 1; North Dakota, 0.5; and Ohio and Michigan, each 0.1.

ANTHRACNOSE (Colletotrichum graminicolum) was severe throughout Burlington County, New Jersey, where in one field observed 50 percent of the plants were killed. It was present with an incidence of 0.62 percent in 52.2 percent of 90 fields examined in Pennsylvania and was estimated to have caused 10 percent loss in Tennessee where it occurred with about average prevalence. Losses in Wisconsin were set at 0.2 percent.

POWDERY MILDEW (Erysiphe graminis) was noted in New Jersey and in Michigan where it was less prevalent than usual and occasioned no loss. It was not observed in 1935 in Illinois.

SCAB (Gibberella saubinetii) occurred in Delaware, Ohio, Illinois, Wisconsin, and Missouri. It was more prevalent than usual in Illinois, Wisconsin, and Missouri where losses ranged from a trace to 0.2 percent. With average incidence in Ohio losses were estimated at 1 percent.

STEM RUST (Puccinia graminis secalis) caused relatively little injury in most states although it was more prevalent than in average years. Texas reported 10 percent loss; Massachusetts, 3; Virginia, 2; Ohio, 1. New Jersey noted its presence, and Illinois, Michigan, Wisconsin, Iowa, Missouri, South Dakota, Wyoming, and Oregon each reported a trace. In Minnesota it was observed only near barberries with the reduction in yield for the State set at 0.

LEAF RUST (Puccinia rubigo-vera secalis) was reported as more severe or much more severe than in 1934 or in average years in Indiana, Illinois, Wisconsin, and Missouri. Losses were estimated as follows: Indiana, 15 percent; Missouri, 10; Wisconsin, 5; Massachusetts, 3; Tennessee and South Dakota, each 2; Ohio and Illinois, each 1; Virginia and West Virginia, each 0.5; Georgia, 0.1: Michigan, Minnesota, Iowa, and Oregon, each a trace.

SCALD (Rhyncosporium secalis) was prevalent in 28.7 percent of the fields surveyed in Illinois. Loss was estimated at 0.5 percent.

STEM SMUT (Urocystis occulta) caused a trace of loss in West Virginia, Tennessee, Illinois, Wisconsin, Minnesota, and Iowa.

FOOT ROTS (various organisms) caused 0.1 percent loss in Oregon.

DROUGHT caused an estimated loss of 15 percent of the crop in Massachusetts.

S O R G H U M   V U L G A R E.   S O R G H U M

MOLDS (Aspergillus spp.) See Molds, Various organisms.

ANTHRACNOSE (Colletotrichum lineola) was reported on both sorghum and broom corn from Tennessee.

FUSARIUM DISEASES (Fusarium spp.) were reported from Texas as follows: Root rot of milo maize, 3 percent injury; stalk rot of milo maize, 3; grain mold of kaffir, 2; head mold of hegari, 2.

LEAF SPOT (*Macrosporium ornatissi* and *Helminthosporium* sp.). These two organisms were reported respectively from Minnesota and Texas as the cause of leaf spot injury amounting to a trace in Minnesota and 1 percent in Texas.

MOLDS (*Penicillium* spp.). See Molds, Various organisms.

RUST (*Puccinia purpurea*) caused 0.5 percent loss in Texas.

PYTHIUM ROOT ROT (*Pythium arrhenomanes*). This disease formerly known as root, crown, and shoot rot of milo was again locally prevalent at Garden City and Hays, Kansas, where it is considered serious. Its distribution in Kansas is not known but according to L. E. Melchers it may become a troublesome disease. Milo, and milo hybrids, as Beaver and Wheatland are very susceptible, while sorgos, kafirs, and feterita appear immune.

CHARCOAL ROT (*Rhizoctonia bataticola*) was observed on hegari in Texas causing a trace of injury.

HEAD SMUT (*Sorosporium reilianum*). Traces of head smut occurred in Texas, Wisconsin, Minnesota, Iowa, and Kansas. Prevalence was less than last year or in average years in both Iowa and Kansas.

COVERED KERNEL SMUT (*Sphacelotheca sorghi*) was reported from Texas, Wisconsin, Iowa, and Kansas. Texas estimated 5 percent loss with milo maize damaged 2 percent. Loss in Kansas was set at 10 percent. Distribution was general and the losses were large in the main sorghum regions where farmers had grown lax in treating seed with copper carbonate. Feterita was practically immune.

MOLDS (various organisms). *Aspergillus* spp. caused injury in Texas of 1 percent on hegari and 5 percent on kaffir. *Penicillium* spp. as a hay mold on hegari caused 2 percent injury and 1 percent as a grain mold on kaffir. Hay mold due to an undetermined cause also resulted in 5 percent loss on sorghum in Texas.

BACTERIAL STRIPE (*Bacterium andropogoni*) appeared to a very limited extent in Minnesota and Kansas.

BACTERIAL LEAF and SHEATH SPOT (*Bacterium holci*) occurred in the usual traces in Iowa.

BACTERIAL STREAK (*Bacterium holcicola*) occurred locally in Minnesota with a maximum incidence in any one field of 4 percent.

TRITICUM AESTIVUM. WHEAT

COLUMBIA BASIN FOOT ROT (*Cercosporella herpotrichoides*). Washington.

ANTHRACNOSE (*Colletotrichum graminicolum*) was more prevalent in Pennsylvania than last year or in average years. The loss there was estimated at 1 percent.

ERGOT (*Claviceps purpurea*). A few heads of ergot were discovered in New York. Ten cases were observed with no loss in Michigan. Traces occurred in Wisconsin and in North Dakota where prevalence was less than last year or in average years.

POWDERY MILDEW (*Erysiphe graminis*) occurred in New Jersey, Pennsylvania, Texas, Indiana, Illinois, Michigan, and Kansas. Losses were estimated at 0.5 percent in Pennsylvania and Texas, and a trace to none in Indiana, Illinois, and Michigan. It was prevalent in the vicinity of Manhattan, Kansas, from October to July. Infection was so severe on some varieties in nursery sowings that awns and glumes as well as all leaves were infected.

FOOT and ROOT ROTS (*Fusarium* sp.). See Foot and Root rots, *Helminthosporium*.

SCAB (*Gibberella saubinetii*) was reported with losses as follows: Massachusetts, Pennsylvania, Michigan, North Dakota, and Kansas, each a trace; Ohio, 0.1 percent; Illinois, 0.2; Virginia, West Virginia, Texas, and South Dakota, each 1; Iowa, 1.5; Indiana and Wisconsin, each 2; Maryland, 3, half of which was due to depreciation in quality; Missouri, 4, three-fourths of which was due to depreciation in quality; Tennessee and Minnesota, each 5. New Jersey reported general prevalence. The disease was less prevalent than in 1934 or in average years in Pennsylvania and much less prevalent in Maryland. Tennessee, Ohio, Illinois, Indiana, Wisconsin, Missouri, and Kansas, each reported increased or much increased prevalence as compared with last year; and five of these States, Tennessee, Indiana, Wisconsin, Missouri, and Kansas reported greater prevalence than in average years.

FOOT and ROOT ROTS (*Helminthosporium sativum*, *Fusarium* spp., and various organisms). Losses were estimated as follows: Pennsylvania, Michigan, Wisconsin, Minnesota, South Dakota, each a trace; Virginia and North Dakota, each 1 percent; Oregon and Texas, each 3; Kansas, 5; Montana, 6. Oklahoma and Indiana also observed the trouble. *Helminthosporium sativum* or *Helminthosporium* sp. was mentioned as the causal agent in Pennsylvania, Texas, Wisconsin, and North Dakota. It was named in combination with *Fusarium* spp. from Michigan, Minnesota, and Oregon. These two

genera were also reported doubtfully as causal agents of dry land foot rot in Kansas and Oklahoma. The disease was attributed to undesignated "various" organisms in Virginia, South Dakota, and Montana.

TAKE-ALL (Ophiobolus graminis) again occurred in scattered local areas in Kansas with an estimated loss of 1 percent. Dr. Hurley Fellows made observations in the infested area from which, "it appears that the severe drought of 1934 did not diminish the amount of take all in infested soil."

FOOT ROT (Phoma sp.) was reported from Texas.

STEM RUST (Puccinia graminis) was severe from Texas northward throughout the central Great Plains area and more serious in the spring wheat states on spring wheat than in any year since 1916. Its presence was reported from Massachusetts, New Jersey, Pennsylvania, Virginia, West Virginia, Tennessee, South Carolina, Georgia, Texas, Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, New Mexico, Oregon, and California. Maryland reported that the disease was not observed. Estimated losses varied from a trace to 65 percent as follows: trace, Pennsylvania, West Virginia, Tennessee, Montana, and Oregon; 0.1 percent, Georgia; 0.5, Michigan; 1, Illinois and Missouri; 1.5, Ohio and Wisconsin; 3, Virginia and South Carolina; 6.5, Iowa; 12, Massachusetts and Kansas; 20, Texas and Wyoming; 21, Nebraska; 40, South Dakota; 60, Minnesota (Spring wheat only, no damage to Winter wheat); 65, North Dakota. The prevailing physiologic forms 11 and 56, particularly 56, attacked Ceres wheat severely. This variety, which was extensively sown, is resistant to many physiologic forms including 34 and 21, abundant in 1934, and others which have prevailed in recent years in the spring wheat states. A newly introduced variety, Thatcher, exhibited high resistance under 1935 conditions.

Comparatively little stem rust survived the severe cold of the early months of 1935 in northern Mexico and Texas. Abundant rains and cool weather during the spring and early summer fostered a good growth of straw throughout most of the grain producing areas from Texas northward. Early prospects for a good crop of wheat were bright. In the southern areas grain was well advanced in maturity before the disease became general and the injury done was largely offset by the favorable growing conditions, which, however, also favored the development of rust which was spreading from the surviving centers. Much of the grain in central and northern areas was late sown and further delayed in development by the cool wet weather. A heavy source of inoculum was built up in Kansas and Nebraska which rapidly spread northward. A succulent growth of straw, frequent light rains, and cool temperatures supplied ideal conditions for the development of the rust which became general and severe throughout Minnesota, the Dakotas, and adjacent territory in the United States and Canada before it

was checked by extremely hot weather and the cessation of rains. While the grain was in the milk with an abnormally low water table and precipitation cut off, the inadequate supply of soil moisture at the surface was promptly exhausted and the immature grain suffered from drought and heat and shriveled badly. The injury done in this way was probably as great as would have resulted from the continued activity of the rust. Under the circumstances, in many cases differentiation between the injury from rust and that from heat and drought was problematical. In Supplements 91, 92, and 93 of the Reporter (1936) are presented detailed discussions of the epiphytotics in Nebraska, Kansas, and Texas, respectively, while the outbreak in South Dakota is reported in the Reporter 20:107-108, April 1, 1936.

LEAF RUST (Puccinia rubigo-vera tritici) appeared early and was severe generally. Of the states reporting, only Michigan noted less prevalence than in 1934. Elsewhere it was more or much more prevalent. Significant comments are: "A rather severe leaf rust year", Chupp, New York. "The average percentage of leaf rust was 67.2 percent as compared with 50 percent in 1934", Kirby, Pennsylvania. "The County Agent in Halifax County told me he was certain that orange rust reduced the wheat yield from 30 bushels to the acre to 6 or 8 in a number of cases. He said it was noticeably worse in good wheat", Wingard, Virginia. "Wheat not yet heading in Fayette County is already heavily infected with leaf rust", Valleau, Kentucky. "Worse than during any of the past seven years. Some growers report 50 to 75 percent loss", Poole, North Carolina. "The rust appeared two weeks earlier than usual", Miller, Georgia. "Severe and only the most resistant strains have escaped serious injury", Atkins, Texas. "One of the heaviest epidemics of leaf rust of wheat on record has occurred in Indiana and neighboring states", Caldwell, Indiana. "Prevalence in fields, 95.66 percent, leaves infected, 20.4 percent", Tehon, Illinois. "Leaf rust infection very heavy but its importance overshadowed by severe stem rust infection", Johnston, Kansas. "In considerable sections of the North Central States, leaf rust overwintered abundantly on wheat." (June 14) "Leaf rust of wheat is prevalent throughout." (June 22, Stakman). Losses were estimated as follows: South Carolina, Michigan, Montana, Wyoming, and Oregon, each a trace; Virginia and West Virginia, each 0.5 percent; Ohio, 1.5; Maryland and Texas, each 2; Tennessee, Minnesota, North Dakota, South Dakota, Nebraska, and Kansas, each 5; New York, 6; Missouri, 7; Massachusetts, 8; Pennsylvania, 12; Illinois, 12.5; Wisconsin, 15; North Carolina and Iowa, each 20; Indiana, 25; Georgia, 50. Kentucky and South Carolina both reported unusual prevalence.

SOUTHERN BLIGHT (Sclerotium rolfsii) was found destroying spots in fields in Hancock County and near Waynesboro in Georgia.

GLUME BLOTCH (Septoria nodorum) occurred in the following states with the estimated percentage losses indicated; Pennsylvania, 2; Maryland, 2; north Georgia, very little; Texas, 0.5; Illinois, 0.1; Kansas, 0.2.

Incidence in Pennsylvania, Illinois, and Kansas was greater than in 1934 or in average years.

SPECKLED LEAF BLOTCH (Septoria tritici) was reported from Pennsylvania, Georgia, Illinois, Missouri, Nebraska, and Kansas. Only traces of the disease were observed in Pennsylvania but in the other states reporting it was more prevalent than last year or in average years. According to J. H. Miller it was impossible to separate the reduction caused by this disease from that due to leaf rust in north Georgia, but he found occasional fields with all leaves dead from leaf blotch before the rust appeared. He believes this disease may have been underestimated in reports coming from southern states. Loss in Illinois was estimated at 5 percent, prevalence in the fields examined being 79.4 percent. C. O. Johnston reported the disease "prevalent at Manhattan, Kansas, until obscured by rusts in June. In the drought area of the southwest it was more prevalent than leaf rust and was severe enough to cause some defoliation."

BUNT (Tilletia levis and T. tritici). Prevalence in most of the States reporting was comparable with that of average years. Pennsylvania reported increased prevalence due to the planting of untreated seed in considerable quantity and a rather cold wet fall in 1934 that favored infection soon after wheat was planted. Bunt occurred in 55 percent of the untreated fields surveyed and the loss for the State was estimated at 3.5 percent of the crop. Maryland also reported increased prevalence with a reduction in yield of 2 percent and additional loss in grade of 3 percent. The "short" form of T. tritici was again the predominating type in the Cache and Boxelder winter wheat areas of Utah as well as in southern Idaho. Relief wheat appeared highly resistant to the "short" smut, and well adapted to dry farming conditions. Losses from smut in other states reporting ranged from a trace to 1 percent, except in Ohio and Michigan where 1.5 and 2.5 percent respectively were estimated, and in West Virginia where a 2 percent reduction was recorded.

FLAG SMUT (Urocystis tritici). In the variety test plots on two farms near Leavenworth, Kansas, where the disease was first found in 1930, prevalence remained unchanged. Harvest Queen selection 2418 was again highly resistant as was Kawvale. Kanred was resistant as in 1934. Local Harvest Queen again appeared very susceptible, also Kanred x H. F. 2671.

LOOSE SMUT (Ustilago tritici) caused percentage losses as follows: Virginia, 3; New York, 1 to 3; Pennsylvania, 2.5; West Virginia and South Dakota, 2; Maryland, northern Georgia, and Missouri, each 1.5; South Carolina, Texas, Michigan, Minnesota, and North Dakota, each 1; Tennessee, Ohio, Illinois, and Montana, each 0.5; Kansas, 0.2; Indiana, Wisconsin, Iowa, and Oregon, each a trace. It was much more prevalent than last year in Delaware and more general than usual in Pennsylvania and Kansas. Tennessee, North Carolina, northern Georgia, Ohio, Illinois, and Michigan reported less than in the average year.

BASAL GLUME ROT (Bacterium atrofaciens) was more prevalent than usual in Illinois and Kansas where losses were estimated at 0.2 percent and a trace respectively.

BLACK CHAFF (Bacterium translucens undulosum) was observed in Wisconsin, Minnesota, Iowa, North Dakota, and Kansas. Losses were estimated at traces in Minnesota and Iowa and in North Dakota where the disease was more prevalent in the Red River Valley than elsewhere; and at 0.2 percent in Wisconsin and Kansas. The disease was severe in some fields in south central Kansas with traces of infection in east central and southeastern counties.

MOSAIC (virus) was reported from Indiana, Illinois, and Kansas.

NEMATODE DISEASE (Anguillulina tritici) was reported from Virginia, West Virginia and northern Georgia. The following comment is quoted in connection with the occurrence at Blue Sulphur Spring, where the disease is locally known as "dead wheat", West Virginia. "First saw it eight years ago; getting worse each year. Changed seed three years ago but without benefit."

PHYSIOLOGICAL DISORDERS. Drought injury was reported from Massachusetts as the cause of 20 percent loss, and from Washington. Its injurious effect in the rust area is mentioned in the discussion of stem rust. Another type of injury was reported from southeastern Kansas where, "Many fields scalded in early June due to excess water. The soil was water-logged for several weeks and the crop on such soils was materially reduced."

WHEAT. See TRITICUM AESTIVUM

ZEA MAYS. FIELD CORN

EAR ROT (Aspergillus sp.). See Ear rots, Various organisms.

BASISPORIUM DRY ROT (Basisporium gallarum) occurred with losses estimated as follows: Indiana, 0.5 percent (principally in southern Indiana on late planted corn killed prematurely by frost); Illinois, 0.39 (prevalence 1.4 percent in fields; 0.76 in ears examined); Wisconsin, 4; Iowa, 2. Minnesota experienced a severe frost October 4. Much corn was injured and developed considerable mold in which Basisporium gallarum, Fusarium spp., and other organisms were involved, but frost was the primary cause. Loss was estimated at 0.5 percent, including both field and sweet corn. See also, Ear rots, Various organisms.

BLACK BUNDLE (Cephalosporium acremonium) caused a trace of loss on field corn in Indiana. In Illinois fields examined 26.9 percent infection was observed and the loss due to barren stalks was estimated at 5.9 percent.

LEAF SPOT (Cercospora sorghi) caused considerable damage on bottom lands in Alabama.

EAR and STALK ROTS (Diplodia zeae) accounted for losses as follows: Massachusetts, none; Maryland and West Virginia, each 0.5 percent; South Carolina, trace; Tennessee and Ohio, each 2; Indiana, 0.8; Illinois, 1.1; Michigan, 0.3; Wisconsin, trace; Iowa, 4; Missouri, trace. The disease was less prevalent than last year or in an average year in Maryland and Michigan, and much less in Indiana. However, the causal organism was more prevalent in Indiana as a seedling blight than in 1934. It caused an additional average loss of 0.5 percent in this form with a maximum incidence in any one field of 50 percent. Illinois and Missouri each reported Diplodia rot more prevalent than in 1934.

LEAF SPOT (Fusarium moniliforme) caused appreciable injury to foliage on bottom lands in Alabama.

EAR ROT (Fusarium moniliforme). See Ear rots, Various organisms.

SEEDLING BLIGHT (Fusarium sp., probably moniliforme) was observed on the Mexican June variety in Arizona.

ROOT ROT (Fusarium spp.). See Root rots, Gibberella saubinetii.

STALK ROT (Fusarium spp.). See Stalk rots, Various organisms.

EAR ROTS (Gibberella saubinetii). See Ear rots, Various organisms.

ROOT ROTS (Gibberella saubinetii, Fusarium spp., Penicillium spp., various causes). Gibberella saubinetii was mentioned as the cause of losses of 3 (plus 2 percent loss in grade), 1, and 0.5 percent respectively by Maryland, Ohio, and Wisconsin. New Jersey and Texas (2 percent loss) named Fusarium spp. as causal organisms. Michigan reported both G. saubinetii and Fusarium spp. as causes of 0.3 percent injury. Fusarium spp. and Penicillium spp. were the cause of root rots in Minnesota. Considerable seedling infection but not enough to cause much killing was noted. Loss was set at 2 percent. Pythium spp. caused a trace of loss in Indiana. According to J. F. Trost, "Areas with maintained abundant rainfall appeared relatively free from late phases of root rotting. Isolated occurrences were found in local areas suffering temporary drought followed by excess rainfall." Root rot occurrence and losses due to various undesignated causes were reported as follows: Massachusetts, 2 percent; Virginia, 2.5; West Virginia, 3; Tennessee, 5; South Carolina, 10; Illinois, 4; Oregon, trace. Texas also reported a trace of loss from root rot caused by alkali injury.

STALK ROT (Helminthosporium sp.). See Stalk rots, Various organisms.

ROOT ROT (Penicillium sp.). See Root rots, Gibberella saubinetii.

EAR ROT (Penicillium sp.). See Ear rots, Various organisms.

EAR ROT (Phoma zeicola). See Ear rots, Various organisms.

LEAF SPOT (Phyllosticta sp.). Texas.

BROWN SPOT (Physoderma zeae-maydis). Mere traces occurred in Georgia, Alabama, and Louisiana.

RUST (Puccinia sorghi) was widely reported but with only negligible losses, as usual.

ROOT ROT (Pythium sp.). See Root rots, Gibberella saubinetii.

EAR ROT (Rhizopus sp.). See Ear rots, Various organisms.

HEAD SMUT (Sorosporium reilianum) was estimated to have caused 0.1 percent loss in Oregon.

SMUT (Ustilago zeae). Twenty-five states reported the occurrence of this disease with loss estimates as follows: Connecticut, Louisiana, Arkansas, and Washington, observed; Wyoming, a trace; Maryland, South Carolina, and Missouri, each 0.5; Vermont, Texas, Indiana, and Kansas, each 1; Virginia and Wisconsin, each 1.5; Tennessee, 2; Illinois, 2.25; North Dakota, 2.5; Michigan, 3.5; Massachusetts, West Virginia, Georgia, and Minnesota, each 4; South Dakota, 5; Ohio, 8; Iowa, 9. Vermont and Ohio estimated prevalence much higher than in 1934 or in the average year. Massachusetts, Maryland, Indiana, Iowa, and North Dakota each regarded it as more prevalent. Michigan reported less than last year or in the average year, Wisconsin an average incidence but less than in 1934, and Missouri less than the average amount and much less than in 1934. The Vermont report was restricted to popcorn. In Georgia more ear smut appeared and less on leaves and stalks this year. Distribution in Louisiana was more abundant in the southwestern part of the State. The disease was "rather common and important" and generally distributed in Kansas. In Indiana some fields showed 3 to 5 percent of the plants killed by smut before tasseling and a maximum infection of 85 percent was observed in one field. Other maximum percentages of infection in any one field reported were; Georgia, 28; Minnesota, 60; Iowa, 17.

EAR ROTS (various organisms other than Diplodia). Phoma zeicola caused a trace of injury in Texas. Aspergillus sp. was generally distributed in Illinois and more prevalent than in 1934 but resulted in practically no loss. Indiana reported that "it was conspicuously absent".

Rhizopus sp. caused a trace of loss in Illinois as did Penicillium sp. in Wisconsin. Ear rots due to various undesignated causes other than Diplodia sp. were reported as follows: Massachusetts, trace; Virginia, 1.5; West Virginia, 5; Tennessee and South Carolina, each 3; South Dakota and Kansas, each 1. Fusarium moniliforme caused a trace of injury in Michigan and 1.5 percent loss in Missouri; Fusarium sp. occasioned losses as follows: Arizona, trace; Indiana, 0.2 percent; Texas, 1; Maryland and Illinois, each 3. In combination with Basisporium gallarum it resulted in 4 percent injury in Wisconsin and 0.5 percent in Minnesota. Gibberella saubinetii was reported as causing the following losses; Indiana, trace, confined to the southwestern part of the State; Illinois, 0.8; Missouri, trace; Texas, 3; Iowa, 2.

ROOT ROT (various organisms). See Root rots, Gibberella saubinetii.

STALK ROTS (various organisms other than Diplodia). Fusarium spp. caused stalk rots in Wisconsin and North Dakota resulting in estimated losses of 5 and 1 percent respectively. Helminthosporium sp. was observed producing stem cankers in New Jersey. Stalk rots from various causes occasioned losses as follows: Massachusetts, a trace; Virginia and West Virginia, each 1 percent; Illinois, 3; Kansas, 2.

BACTERIAL WILT (Aplanobacter stewarti) continued to decline in prevalence and severity. Its incidence was reported by Massachusetts, New Jersey, Maryland, Virginia, West Virginia, Texas (popcorn and field corn), Indiana, Illinois (Richland County only), Michigan, and Kansas. Losses did not exceed a trace except in Virginia and on field corn in Texas where the estimates were placed at 2 percent.

BACTERIAL STALK ROT (Bacterium dissolvens) occurred in more than usual prevalence but with only a trace of loss in Indiana on fields subject to overflow. It was also more prevalent in Missouri where it caused traces of loss in scattered local areas.

LEAF BLIGHT (Bacterial) continued to decline in prevalence in Indiana. Its incidence was less in 1934 than in 1933, and only traces developed in 1935, when it was "much less prevalent" and "practically absent from the State". A leaf spot believed to be of bacterial origin caused a trace of loss in Texas.

MOSAIC (virus) was again general with about the usual prevalence in Louisiana. It is regarded of slight importance.

STRIPE (virus) was observed in Puerto Rico by Cook and Roque and is said to be "apparently the same disease as reported by Stahl in Cuba and Briton Jones in Trinidad."

MALNUTRITION caused by "unbalanced and inadequate supplies of phosphate and/or potash" was estimated by John F. Trost to account for a 2 percent reduction in yield in Indiana and an additional 2 percent loss in quality. Generally late planting and exceptionally early killing frosts supplied conditions which demonstrated the effects of the nutrient deficiencies more strikingly than in average years. Insufficiently nourished fields were delayed in development and consequently immature when killed. In addition and as a result the crop was further subject to deterioration from storage rots.

Z E A   M A Y S.   S W E E T   C O R N

BLACK BUNDLE (*Cephalosporium acremonium*) was reported from Indiana.

STALK and EAR ROTS (*Diplodia zeae*) caused the following losses: Virginia, 0.5 percent, West Virginia, 1; Indiana, 6; Wisconsin, 6.5; Iowa, 4. Maryland reported 2 percent loss due to various organisms.

FOOT ROTS (*Fusarium* spp.). See Foot rots, Various organisms.

FOOT ROTS (*Penicillium* spp.). See Foot rots, Various organisms.

RUST (*Puccinia sorghi*) occurred in traces in New York, Wisconsin, and Iowa.

SMUT (*Ustilago zeae*) was reported from Massachusetts "widely distributed and caused severe damage in places"; New York, reporting for Richmond County, P. P. Pirone states, "much more prevalent in all fields this year; loss about 8 percent"; Maryland, 1; New Jersey, present; Virginia, 1; West Virginia, 3; Tennessee, 2; Indiana, 5, "much more prevalent, 1 percent of plants killed by seedling infection with smut"; Minnesota, 4, "less prevalent, maximum infection 50 percent"; Iowa, 12, more prevalent; South Dakota, 6.

FOOT ROTS (various organisms) caused an estimated loss in Maryland of 6 percent; Minnesota 2 (*Fusarium* spp. and *Penicillium* spp.); Oregon, 0.1.

BACTERIAL WILT (*Aplanobacter stewarti*) was generally less prevalent in 1935. Reports were received as follows: Massachusetts, "Almost totally absent, just a trace in Westfield, West Springfield, and Falmouth"; Connecticut, "Only two reports, even less than last year when it was much less than the two previous years"; New York, "A few scattered cases from 3-year-old seed in extra early varieties in upstate counties. Heavy infestation on late-maturing corn on Long Island. No loss to crop though"; Maryland, 1.5 percent, "Susceptible varieties grown to a very limited extent"; Virginia, 2.5; West Virginia and Indiana, each 5; Michigan, trace, "Few specimens sent in or found. Infected plants 'grew out' of the disease"; Wisconsin, trace; Iowa, trace, "very scarce".

BACTERIAL STALK ROT (Bacterium dissolvens) occurred on experimental plantings at Lafayette, Indiana, in overflow areas a week after they were subjected to flooding July 2.

DISEASES OF FORAGE AND COVER CROPS

LEGUMES

ALFALFA. See MEDICAGO SATIVA

CLOVER. See TRIFOLIUM spp.

COWPEA. See VIGNA SINENSIS

CROTALARIA spp. CROTALARIA

MOSAIC (virus) was reported from Puerto Rico where it is said to be controlled by roguing out volunteer plants before sowing seed and promptly removing any diseased plants which appear in the crop.

LESPEDEZA sp. LESPEDEZA

POWDERY MILDEW (Mi phaera diffusa) was abundant in plantings at Arlington, Virginia.

MEDICAGO SATIVA. ALFALFA

LEAF SPOT (Cercospora medicaginis) caused 1 percent loss in Texas and 2 in Iowa.

ANTHRACNOSE (Colletotrichum trifolii) appeared in traces in Texas.

DOWNY MILDEW (Peronospora trifoliorum) was observed in New Jersey, Wisconsin, Iowa, Wyoming, Washington, and California. Losses were negligible.

ROOT ROT (Phymatotrichum omnivorum) was estimated to have caused 15 percent loss in Texas.

SLIME MOLD (Physarum cinereum) was reported from New Jersey.

LEAF SPOT (Pseudopeziza medicaginis) was generally said to be more prevalent than usual. Losses reported were; Illinois and Iowa, 3 percent;

North Dakota and Wyoming, 2; Kansas, 0.1; Michigan, a trace. In Illinois from July 1 on, fields generally had 100 percent of plants infected with 40 to 80 percent of the leaves showing spots. Wyoming also reported 100 percent infection in fields.

YELLOW BLOTCH (Pyrenopeziza medicaginis) was reported as very prevalent in Wisconsin, Kansas, and Missouri. Losses of 4 percent were estimated for Kansas and Missouri.

DAMPING OFF (Pythium sp.) was more prevalent in Kansas than usual. It is said to be troublesome wherever alfalfa is fall sown on fallow. As high as 20 percent infection was observed in certain fields, but the full amount of the loss in crop was not determined.

VIOLET ROOT ROT (Rhizoctonia crocorum) was "very destructive in new stands, following an extremely rainy period" in Delaware.

STEM CANKER (Rhizoctonia sp.) was reported from Wisconsin.

STEM ROT (Sclerotinia trifoliorum) was reported from New Jersey, Kentucky, Missouri, and Washington.

LEAF SPOT (Thyrospora sarcinaeformae [Macrosporium sarcinaeforme]) was reported locally in Illinois.

RUST (Uromyces medicaginis) occurred in New Jersey, Texas, Illinois, and Missouri. While prevalence was reported to be above the average, losses did not exceed a trace.

BACTERIAL WILT (Aplanobacter insidiosum). Reports were received from Massachusetts, New York, Iowa, Illinois, Wisconsin, Minnesota, Kansas, Wyoming, and California. Massachusetts, Iowa, and Wyoming each report 10 percent injury. It is found only under irrigation in Wyoming. In New York according to Chupp, "The disease was not reported in 1935, but may be present. In 1934 material was collected in Wayne County. Dr. Burkholder made isolations and since then has proved its pathogenicity." The report of its occurrence in Minnesota is also qualified as follows by C. C. Allison: "No reports, although verbal statements from county agents indicate that some injury did occur. However, alfalfa stands were not good this year."

STEM NEMATODE (Anguillulina dipsaci) was prevalent and important locally in California.

MOSAIC (virus) was reported from Washington.

WITCHES BROOM (virus) was present again in Washington.

DODDER (*Cuscuta* sp.) Texas.

YELLOWS (due to potato leaf hopper, *Empoasca fabae*) was less prevalent than in 1934 or in an average year in Wisconsin and Iowa.

WHITE SPOT (non-parasitic) was reported from New Jersey and Connecticut.

YELLOW TOP (non-parasitic) was observed in two counties in Washington.

WINTER INJURY. Iowa, Wisconsin, and North Dakota each reported considerable winter injury.

M E L I L O T U S spp. S W E E T C L O V E R

ASCOCHYTA CANKER (*Ascochyta* sp.). Verbal reports are stated by C. C. Allison to indicate this disease was widespread and more prevalent than usual in Minnesota.

LEAF SPOT (*Cercospora* spp.). *Cercospora davisii* was estimated to have caused 8 percent loss in Iowa. *C. zebrina* was abundant on *M. indica* in California.

STEM ROT (*Sclerotinia sclerotiorum*) in California occurred on both *Melilotus alba* and *M. indica*. The same organism also caused a leaf spot on both species. According to F. L. Ballard in *Country Gentleman* (June) stem rot in Western Oregon is now virtually under control through the use of seed of a resistant stock of which about 50,000 pounds was certified in 1934.

SOUTHERN BLIGHT (*Sclerotium rolfsii*) was observed causing 10 percent loss in Texas.

LEAF SPOT (undetermined). A trace of loss occurred in southwestern Wisconsin and in Minnesota from a leaf spot as yet unidentified.

S O J A M A X. S O Y B E A N

LEAF SPOT (*Alternaria atrans*) was collected in Monroe County, New York.

FROG EYE (*Cercospora diazu*). Scattered infections were observed in Mississippi.

POD BLIGHT (*Diaporthe sojae*) New York.

WILT (*Fusarium tracheiphilum*) was reported from Georgia. Thirty percent infection was found in a field in Clarke County.

DOWNY MILDEW (Peronospora manshurica) was much more prevalent than usual in Illinois where it assumed considerable importance. Its prevalence in the fields examined was 84.7 percent with half of the leaves infected.

ROOT ROT (Phymatotrichum omnivorum) caused injury as high as 20 percent in Texas.

STEM ROT (Sclerotium rolfsii). Georgia and Mississippi.

BACTERIAL BLIGHT (Bacterium glycineum) was found in a variety test at Pillsford, New York. It was general and more prevalent than usual in Illinois where about 50 percent of the leaves were infected on 95 percent of the plants in fields examined.

BACTERIAL PUSTULE (Bacterium phaseoli sojense) was reported from Georgia, Mississippi, and Louisiana.

MOSAIC (virus). New Jersey.

SOYBEAN. See SOJA MAX

STIZOLOBIUM DEERINGIANUM. VELVETBEAN

LEAF SPOT (Cercospora stizolobii). Georgia.

ROOT ROT (Phymatotrichum omnivorum). Texas.

SWEET CLOVER. See MELILOTUS spp.

TRIFOLIUM spp. CLOVER

CROWN ROT (Botrytis sp.). Kentucky on Trifolium incarnatum.

ANTHRACNOSE (Colletotrichum trifolii) was observed in New Jersey, Tennessee, Texas, and Wisconsin.

POWDERY MILDEW (Erysiphe polygoni) was reported on Trifolium pratense from Connecticut and California, on T. procumbens from the District of Columbia and on Trifolium spp. from Massachusetts, New Jersey, District of Columbia, Tennessee, and Wisconsin.

DOWNY MILDEW (Peronospora trifoliorum). Sheridan County, Wyoming, on Trifolium pratense.

SOOTY SPOT (Phyllachora trifolii). New Jersey.

LEAF SPOT (Pseudopeziza trifolii) was abundant locally in Knox and Hawkins Counties in Tennessee on Trifolium spp. It was also reported on T. repens from Oregon and on T. pratense from Washington.

CROWN ROT (*Sclerotinia trifoliorum*). This disease either as a rot of roots, crowns, or stems was reported on *Trifolium incarnatum* from New Jersey, Kentucky, and Tennessee; on *T. pratense* from Kentucky; on *T. medium* from Oregon; and on *Trifolium* spp. from New Jersey.

RUST (*Uromyces* spp.). Massachusetts reported rusts as more prevalent than for five years. *Uromyces trifolii fallens* was reported on *Trifolium pratense* from Connecticut, on *Trifolium* spp. from New Jersey and Texas, and on *T. subterraneum* from Oregon; *U. trifolii hybridi* on *T. hybridum* from Texas; *U. elegans* on *T. carolinianum* from Alabama; *U. minor* on *T. parryi* from Wyoming.

VELVETBEAN. See STIZOLOBIUM DEERINGIANUM

VETCH. See VICIA spp.

V I C I A sp. V E T C H

LEAF SPOT (*Ascochyta pisi*) seemed to be the cause of failure of the crop in one New York orchard where vetch was planted as a cover crop.

RUST (*Uromyces fabae*). Texas and California on *Vica faba*.

STREAK (virus). Washington.

SPOTTED WILT (virus). California on *Vica faba*.

CURLY TOP (virus). California on *Vica faba*.

V I G N A S I N E N S I S. C O W P E A

LEAF SPOT (*Cercospora cruenta*) appeared in Georgia and Texas.

LEAF SPOT (*Cercospora diazu*). Mississippi.

SCAB (*Cladosporium vignae*). Mississippi.

POWDERY MILDEW (*Erysiphe polygoni*) was reported from New Jersey, Georgia, and Texas.

DRY ROOT ROT (*Fusarium martii phaseoli*) appeared in Mississippi.

WILT (*Fusarium vasinfectum tracheiphilum*) was observed in North Carolina, Georgia, and Texas. The disease was abundant throughout the eastern part of North Carolina, however, a strain of the Iron cowpea has been found which is resistant to both nematode and wilt disease and small packages of the seed are being distributed in counties where wilt is prevalent.

DOWNY MILDEW (Peronospora sp.). New Jersey.

ROOT ROT (Phymatotrichum omnivorum). Texas.

RHIZOCTONIA (Rhizoctonia sp.). Texas.

CHARCOAL ROT (Rhizoctonia bataticola). Texas.

SOUTHERN BLIGHT (Sclerotium rolfsii). Mississippi and Texas.

RUST (Uromyces vignae) was present in Texas where it was estimated to have caused 3 percent injury.

BACTERIAL DISEASES. A spot attributed to Bacillus sp. was reported from New Jersey; a stem streak due to Bacillus lathyri and a blight caused by Bacterium pisi from Texas.

HOPPER INJURY (Leaf hoppers). New Jersey.

GRASSES

A G R O P Y R O N spp. W H E A T G R A S S

ERGOT (Claviceps purpurea) on Agropyron pauciflorum and on A. pseudorepens from Wyoming; on A. repens from Wisconsin, Iowa, and North Dakota; and on A. smithii from North Dakota, Kansas, and Wyoming.

STEM RUST (Puccinia graminis) on Agropyron inerme from North Dakota; on A. pauciflorum from Wyoming and North Dakota; on A. repens from Iowa; and on A. smithii and A. spicatum from North Dakota.

LEAF RUST (Puccinia rubigo-vera agropyrina) on A. repens from West Virginia, and on A. violaceum from Wyoming.

A G R O S T I S A L B A. R E D T O P

ERGOT (Claviceps purpurea). Iowa.

STEM RUST (Puccinia graminis). Connecticut, Pennsylvania, and Iowa.

A N D R O P O G O N spp. B E A R D G R A S S

ERGOT (Claviceps purpurea) on Andropogon furcatus from Kansas.

SMUT (Sphacelotheca andropogonis) on A. furcatus and A. scoparius from Kansas.

SMUT (_Ustilago ischaemi_) on _A. scoparius_ from Kansas.

Dothichloe atramentosa on _Andropogon_ sp. from Kansas.

A V E N A F A T U A. W I L D O A T

RUST (_Puccinia coronata_). North Dakota.

B O U T E L O U A G R A C I L I S. B L U E G R A M A

SMUT (_Ustilago boutelouae_). Kansas.

B R O M U S spp. B R O M E G R A S S

RUST (_Puccinia graminis_) on _B. marginatus_. North Dakota.

STRIPE (_Scolecotrichum graminis_) on _Bromus carinatus_. Washington.

Septoria bromigena on _B. inermis_. North Dakota.

SMUT (_Ustilago bromivora_) on _B. tectorum_. Montana.

LEAF and GLUME SPOT (_Bacterium coronafaciens atropurpureum_) on _B. inermis_. Kansas.

B U C H L O E D A C T Y L O I D E S. B U F F A L O G R A S S

LEAF SPOT (_Cercospora seminalis_). Texas.

SMUT (_Tilletia buchloeana_). Kansas.

C Y N O D O N D A C T Y L O N. B E R M U D A G R A S S

Diplodina graminea. South Carolina.

BROWN PATCH (_Helminthosporium_ sp.). Texas.

Macrosporium sp. South Carolina.

SLIME MOLD (_Physarum_ sp.). Texas.

SMUT (_Ustilago cynodontis_). Texas.

D A C T Y L I S G L O M E R A T A. O R C H A R D G R A S S

Septoria graminum. Kansas.

DISTICHLIS STRICTA. DESERT SALTGRASS

RUST (*Puccinia aristidae*). North Dakota.

ELYMUS spp. WILD RYE

ERGOT (*Claviceps purpurea*) on *Elymus condensatus* from Montana and Wyoming; on *E. glaucus* from Wyoming; on *E. macounii* from North Dakota; and on *E. virginicus* from Kansas.

Phyllachora sp. on *E. condensatus* from Montana.

RUST (*Puccinia graminis*) on *E. canadensis* from North Dakota and on *E. condensatus* from North Dakota and Wyoming.

LEAF SPOT (*Scolecotrichum graminis*) on *E. canadensis* from North Dakota.

SMUT (*Ustilago striaeformis*) on *E. virginicus* from Kansas.

HOLCUS LANATUS. VELVET GRASS

RUST (*Puccinia coronata*). West Virginia.

HORDEUM spp. BARLEY (WILD)

RUST (*Puccinia graminis*) on *Hordeum jubatum* from Iowa, North Dakota, and Wyoming; and on *H. nodosum* from Wyoming.

LEAF SPOT (*Scolecotrichum graminis*). Wyoming.

LEAF SPOT (*Septoria passerinii*). Iowa.

SMUT (*Ustilago lorentziana*). North Dakota.

KOELERIA CRISTATA. JUNEGRASS

ERGOT (*Claviceps purpurea*). Kansas.

LOLIUM spp. RYEGRASS

Helminthosporium siccans and *Ovularia lolii* were reported on *Lolium perenne* from Oregon, also *Puccinia coronata* on *L. multiflorum*. The rust was parasitized by *Darluca filum*. The following organisms were reported on *Lolium* spp. from the same State: *Ascochyta* sp., *Cladosporium* spp., *Helminthosporium sativum*, *Heterosporium* sp., *Phytophthora* sp., *Scolecotrichum graminis*, *Septoria* sp., and *Titea* spp.

P A S P A L U M spp.

ERGOT (Claviceps paspali) on Paspalum spp. from Arkansas.

P H A L A R I S A R U N D I N A C E A

STRIPE SMUT (Ustilago echinata). North Dakota.

P H L E U M P R A T E N S E. T I M O T H Y

RUST (Puccinia graminis phleipratensis). New Jersey, Iowa, and Wyoming.

P H R A G M I T E S C O M M U N I S. R E E D, C O M M O N

RUST (Puccinia phragmitis). North Dakota.

P O A spp. B L U E G R A S S

ERGOT (Claviceps purpurea) on Poa canbyi from Wyoming.

POWDERY MILDEW (Erysiphe graminis) on P. pratensis from Iowa.

RUST (Puccinia graminis poae) on Poa bulbosa from North Dakota, and on P. pratensis from Connecticut and Iowa.

BROWN PATCH (Rhizoctonia sp.). on P. pratensis from Arizona.

SMUT (Ustilago hypodytes) on P. ampla from Washington.

S E T A R I A spp., M I L L E T, F O X T A I L

DOWNY MILDEW (Sclerospora graminicola) on S. viridis from Iowa.

SMUT (Ustilago crameri) on S. italica from New Jersey and Iowa.

SMUT (Ustilago neglecta) on S. lutescens from Iowa.

NEMATODE (Heterodera marioni) on Setaria verticillata from Hawaii and on S. viridis from Kentucky.

LEAF SPOT (Helminthosporium setariae) on Setaria italica from Maryland.

SPOT (Pseudomonas holci) on S. lutescens from Iowa.

SORGHASTRUM NUTANS. INDIAN GRASS

SMUT (*Cerebella andropogonis*). Kansas.

ERGOT (*Claviceps purpurea*). Kansas.

SORGHUM HALEPENSE (*Holcus halepensis*). JOHNSON GRASS

LEAF SPOT (*Cercospora halepensis*). Alabama.

BLIGHT (*Helminthosporium turcicum*). Alabama and Maryland.

RUST (*Puccinia purpurea*). Texas.

SMUT (*Sphacelotheca sorghi*). Texas, Kansas, New Mexico, and Arizona.

SORGHUM VULGARE var. SUDANENSE SUDAN GRASS

ANTHRACNOSE (*Colletotrichum lineola*). Texas.

LEAF BLIGHT (*Helminthosporium turcicum*). Texas.

RUST (*Puccinia purpurea*). Texas.

BACTERIAL STRIPE (*Bacterium andropogoni*). Texas.

SPOROBOLUS spp. DROPSEED

LEAF SPOT (*Helminthosporium ravenelii*) on *S. indicus* from Alabama and on *Sporobolus* sp. from Texas.

RUST (*Puccinia graminis*) on *S. cryptandrus* from North Dakota.

UNDETERMINED GRAMINEAE

BROWN PATCH (*Corticium vagum*). "Least seen in years" in Massachusetts. Observed on golf courses in New Jersey.

Fuligo cinerea occurred on various grasses in New York and an unidentified slime mold was reported from Virginia.

SNOW MOLD (*Fusarium* sp.). Washington.

LEAF SPOT (*Helminthosporium* spp.) was reported from New Jersey and Florida. A specimen was sent in from the vicinity of Redlands, California, where it occurred on a golf green.

SLIME MOLD (Physarum cinereum) was reported from Connecticut and New Jersey.

BLAST (Piricularia grisea). New Jersey. Common but not serious.

LITTLE BROWN PATCH (Sclerotium rhizodes). Massachusetts reported "the least seen in ten years."

STRIPED SMUT (Ustilago striaeformis). Massachusetts. "Least seen in years."

DISEASES OF FRUIT CROPS

AMYGDALUS PERSICA. PEACH

ROOT ROT (Armillaria mellea). Texas.

BLACK MOLD (Aspergillus niger). Texas.

SCAB (Cladosporium carpophilum) was reported as more prevalent than usual in Maryland, West Virginia, South Carolina, Ohio, and Missouri. In Mississippi there was less than usual, due to dry weather and the small crop, Kansas reported much less. Most of the other reports on this disease indicated about average amounts. In general, even where there was more than usual, well-sprayed orchards suffered little loss. In northeastern Arkansas, according to Edgar F. Vestal, a severe outbreak of brown rot was associated with poor control of scab. The scab lesions caused cracking of the fruit due to rapid growth during rains following a light drought. In one orchard counts showed that 90 percent of the peaches attacked by brown rot were cracked from scab injury. Losses of 1 percent or more estimated as due to scab are 10 percent in South Carolina, 5 in North Carolina, 3 in Ohio, 2 in Pennsylvania, Maryland, and Texas, and 1 in Illinois and West Virginia.

BLIGHT (Coryneum beijerincki) was reported from Indiana, Illinois, Washington, Oregon, and California. Oregon reported more damage than usual and California the worst infection in thirty years, with defoliation, twig killing, and fruit spotting.

WOOD ROT (Fomes applanatus). New Jersey.

STEM CANKER (Phoma persicae) was reported for the first time from Mississippi where it developed on a large percentage of seedlings in a nursery. It was observed in scattered areas in a nursery in Kentucky also. (Plant Disease Reporter 19:139).

SEEDLING STEM CANKER (Phytophthora cactorum) appeared in an aggravated form in nursery stock in Arkansas for the first time since 1930. In one nursery 30 percent budded stock was affected, as well as seedlings.

BROWN ROT (Sclerotinia fructicola) was reported from the following states with the percentage losses indicated: Massachusetts, Connecticut, New York, New Jersey, and Pennsylvania, 10 percent; Delaware, generally prevalent on early varieties; Maryland, 5; Virginia, 3, "twig and blossom blight stages unusually severe, rot prevalent on fruit of early varieties, spraying prevented a serious outbreak"; West Virginia, 1; Kentucky, South Carolina, 5; Tennessee, 35, "an unusual outbreak of oriental fruit moth had much to do with the development of the disease"; North Carolina, "much less than in 1934, losses in unsprayed orchards of early varieties were from 20 to 90 percent, blossom blight resulted in nearly complete loss of crop in some orchards in the Piedmont areas"; Mississippi, less than usual; Texas, 2; Arkansas, "rather prevalent as blossom blight and fruit rot on early varieties"; Ohio, 3, more than usual; Indiana, 1.5, more than usual; Michigan, 10, more than usual, much more than in 1934; Iowa, 3, more than usual; Missouri, much more than last year or in an average year; Kansas, less than last year and much less than usual; Washington and Oregon, 3; California, "general, more than in 1934 and much more than in an average year, some damage to blossoms but most of the loss in fruit rot."

POWDERY MILDEW (Sphaerotheca pannosa). Texas, Washington, Oregon.

LEAF CURL (Taphrina deformans) was reported from twenty-four States. Of these only two, Tennessee and Mississippi, reported it as less prevalent than usual; while six, New Jersey, Pennsylvania, Maryland, Virginia, Arkansas, and Oregon stated that it was more prevalent than last year or in an average year; and eight, New York, Delaware, West Virginia, Ohio, Illinois, Michigan, Missouri, and California found it much more prevalent. Other states reporting leaf curl are Massachusetts, Connecticut, North Carolina, South Carolina, Texas, Iowa, and Kansas. Losses in sprayed orchards were generally relatively low but where spraying was neglected the orchards were more or less seriously defoliated and the disease appeared on the fruit in many cases. Losses were reported as follows: Michigan, 15 percent; Illinois, 10; Pennsylvania, 8; West Virginia and North Carolina, each 5; Maryland, Ohio, and Iowa, each 2; Tennessee, 1.5; Texas and Oregon, each 1.

RUST (Tranzschelia pruni-spinosae) was unimportant in California in 1935. It was also reported from Texas.

BACTERIAL SPOT (Bacterium pruni) occurred in Massachusetts, Connecticut, New York, New Jersey, Delaware, Maryland, Tennessee, North Carolina, Mississippi, Texas, Arkansas, Ohio, Illinois, and Missouri. R. F. Poole reports that "Bacterial spot was of no economic importance in North Carolina this year. There was very little leaf infection, and practically no infection on early varieties and only slight infection on the Hale variety." In Arkansas according to the Department of Plant Pathology, bacterial spot

was not seen on the fruit but occurred in fairly severe form on the leaves. W. D. Mills in New York states that "It is not possible to evaluate reports of bacteriosis without examination of material. An inspection in 1932 of fifty orchards supposedly affected with this disease revealed one true case and forty-nine of arsenical injury."

CROWN GALL (Bacterium tumefaciens). Texas.

ROOT KNOT (Heterodera marioni) did much damage in North Carolina to young peach trees particularly to new orchards set on land formerly planted to cotton, cowpeas or susceptible crops. Texas also reported 2 percent loss.

LITTLE PEACH (virus), reported from New York, New Jersey, Pennsylvania, Tennessee, and Michigan.

MOSAIC (virus). Texas, Colorado, and California.

PHONY PEACH (virus). South Carolina reports that sixty-eight diseased trees were removed from one orchard but fortunately phony peach is not very common in that State. In Mississippi scouting in the vicinity of commercial orchards showed a considerable amount of scattered infection. One commercial orchard of 25,000 trees contained 3,000 that were affected. Texas estimated 0.5 percent of loss from the disease and Illinois reported one tree found. In a talk before the Eastern Plant Board November 13, Mr. B. M. Gaddis stated that in the campaign of control over 3,250,000 peach trees had been removed since the early part of August. According to the News Letter of the Bureau of Entomology and Plant Quarantine, the most complete survey of recent years was made in the states of Delaware, New Jersey, Maryland, Virginia, West Virginia, Kentucky, and Indiana, none of which were known to be infected. This survey resulted in finding infected orchards in two counties in Maryland and five counties in Kentucky. A comprehensive survey was also made of the lightly infected states of Missouri, Illinois, Arkansas, Tennessee, North Carolina, and South Carolina, and in the commercial areas of the generally infected states of Texas, Louisiana, Mississippi, Alabama, and Georgia. The phony peach disease was found in less than 1 percent of the nine million trees inspected in the thirteen known infected states. Comparison with former years shows a marked decrease in the number of diseased trees found in the generally infected area and results point distinctly toward the practicability of control. The work of 1935 also included the inspection in twelve States of zones surrounding 113 commercial peach nurseries, 26 of which were found to be exposed to infection. It was found in Georgia and Alabama that numerous orchards which had been thoroughly cleaned up were being reinfected from some outside source, which, on examination, proved to be the presence of infected escaped peach trees growing near the orchards and serving as reservoirs of infection. (See also Plant Disease Reporter 20:32-34).

RED SUTURE (virus). Michigan.

ROSETTE (virus). Illinois reported the finding of two cases.

YELLOWS (virus) was observed in New York where it is said to be confused in some cases with winter injury; Pennsylvania, 0.5 percent; Maryland, 0.5; Tennessee, trace; and Michigan where the combined loss from yellows, little peach, and red suture was estimated at 3 percent. Little peach and red suture are more prevalent in Michigan than yellows.

CHLOROSIS (non-parasitic). Texas and Washington.

FASCIATION (non-parasitic). New Jersey.

WEATHER INJURY. Frost damage to buds was reported from New York, New Jersey, Arkansas, and Illinois; hail injury from New Jersey; and winter injury from Massachusetts, the Hudson Valley of New York, Virginia, and Illinois.

"X" DISEASE (cause undetermined) was reported by Stoddard from Connecticut again as "present in all orchards under observation but without much increase over last year. None was found in the southern part of the State."

AMYGDALUS PERSICA NECTARINA. NECTARINE

YEAST ROT (*Oospora lactis*). Texas.

BROWN ROT (*Sclerotinia fructicola*). Texas.

POWDERY MILDEW (*Sphaerotheca pannosa*). Oregon. This does not seem to be common on nectarine.

ANANAS SATIVUS. PINEAPPLE

WILT (undetermined). A wilt on the Smooth Cayenne variety was reported from Puerto Rico. The original stock came from Hawaii. The disease is transmitted in slips and suckers and by mealy bugs which are carried by ants.

APPLE. See MALUS SYLVESTRIS

APRICOT. See PRUNUS ARMENIACA

BLACKBERRY. See RUBUS sp.

BLUEBERRY. See VACCINIUM spp. and V. CORYMBOSUM

CHERRY. See PRUNUS sp.

C I T R U S spp. C I T R U S

CANKER (*Bacterium citri*). See Plant Disease Reporter 20:34-36.

C Y D O N I A O B L O N G A. Q U I N C E

PINK ROT (*Cephalothecium* sp.). New Jersey.

LEAF BLIGHT (*Fabraea maculata*) was reported from New York, New Jersey, Pennsylvania, Tennessee, and Mississippi.

BITTER ROT (*Glomerella cingulata*). Massachusetts and New Jersey.

RUST (*Gymnosporangium clavipes*). Massachusetts, New York, New Jersey, and Illinois.

FRUIT SPOT (*Mycosphaerella pomi* /*Phoma pomi*/). Massachusetts, New York, and New Jersey.

BLACK ROT (*Physalospora obtusa*). Massachusetts and New Jersey.

BLIGHT (*Bacillus amylovorus*). Massachusetts; New York, less prevalent than usual; New Jersey; Pennsylvania, 5 percent loss; Tennessee, severe locally probably causing 10 percent loss; Mississippi and Texas.

CROWN GALL (*Bacterium tumefaciens*). New Jersey.

DEWBERRY. See RUBUS sp.

E R I O B O T R Y A J A P O N I C A. L O Q U A T

ANTHRACNOSE (*Gloeosporium* sp.). Texas.

F I C U S C A R I C A. F I G

THREAD BLIGHT (*Corticium koleroga*) was reported from Louisiana as very destructive, and from Mississippi.

LIMB BLIGHT (*Corticium salmonicolor*). Mississippi and Louisiana.

RUST (*Physopella fici*). Louisiana and Texas.

TWIG BLIGHT (*Stilbum cinnabarinum*). Louisiana and Texas.

TWIG BLIGHT (*Tubercularia fici*). Louisiana and Texas.

ROOT KNOT (Heterodera marioni). Mississippi and Texas.

MOSAIC (virus). California.

FIG. See FICUS CARICA

FRAGARIA sp. STRAWBERRY

SLIME MOLD (Diachaea leucopoda). Mississippi.

GRAY-MOLD ROT (Botrytis cinerea) was reported from New Hampshire, Massachusetts, New York, Mississippi, Louisiana, Texas, and Arkansas. Due to wet weather during the fruiting and packing season there was more than usual in Massachusetts and Connecticut. New York also reported more. In Mississippi and Louisiana, on the other hand, dry weather inhibited its development and there was less than usual. Losses reported were 10 percent in Massachusetts and 5 percent in Louisiana.

ANGULAR SPOT (Dendrophoma obscurans). Minnesota.

LEAF SCORCH (Diplocarpon earliana). Losses were reported from Wisconsin and Oregon, a trace; Pennsylvania, 0.5 percent; Maryland and Virginia, 1; Louisiana, 3; Tennessee, 10. In Arkansas the disease was rather common on the Klondike variety and caused considerable loss at least in the northwest part of the State. In Louisiana there was less loss than usual due to the almost universal use of control measures and to the dry season.

SLIME MOLD (Fuligo sp.). New Jersey, Texas, and Kansas.

LEAF SPOT (Mycosphaerella fragariae). More than usual appeared in Massachusetts. The wet weather of early summer, and again in September, was extremely favorable for this disease which attacked most varieties grown in the State except Premier or Howard 17. Ohio also reported more and Missouri much more than usual. In New Jersey the disease appeared much earlier than for the past few years. In Virginia, leaf spot was very common. In Arkansas, also it was very prevalent, and appeared to be the cause of considerable loss. In Mississippi and Louisiana there was less than usual due to the dry season and also, in the latter State, to the general practice of spraying. Losses estimated are 8 percent in Louisiana; 3 in Virginia and Iowa; 2 in Tennessee; 1 in Pennsylvania, Maryland, Texas, and Oregon; 0.2 in Ohio; and traces in North Dakota, Montana, and Wyoming. The disease was reported also from Wisconsin, Minnesota, Kansas, and Washington.

FRUIT ROT (Penicillium sp.) caused much loss in Suffolk County, New York.

RHIZOCTONIA ROOT ROT (Rhizoctonia sp.). Texas.

LEAK (Rhizopus nigricans). New Jersey, Texas, and Kansas.

CROWN ROT (Sclerotinia sclerotiorum) was one of the chief factors responsible for the extremely poor crop in Louisiana according to Plakidas. Its development was favored by cold wet weather and by freezing injury to the plants. (See Plant Disease Reporter 19:132-134).

POWDERY MILDEW (Sphaerotheca humuli) was more prevalent than usual in New York and California. It was also reported from Washington.

WILT (Verticillium sp.).was reported by H. E. Thomas from Butte, Santa Clara, Santa Cruz, and Monterey Counties, California.

DWARF (Aphelenchoides fragariae) occurred in Massachusetts, Maryland, Tennessee, North Carolina, Louisiana, and Texas. Losses did not exceed 0.5 percent and were usually confined to a trace. The disease in Massachusetts differs in some respects from that occurring in the Southern States and it is now thought to be caused by a different physiological strain of the nematode. (See also Plant Disease Reporter 20:19-22).

CRINKLE (virus). Washington.

YELLOWS (virus) was reported by Harold E. Thomas as general in California wherever the Banner or Marshall varieties are grown. The Dorsett variety is moderately susceptible. A disease reported as yellows caused a loss of 6 percent in Montana.

VIRUS DISEASES. Oregon reported 20 percent loss from all virus diseases, including yellows, crinkle, and witches' broom.

BLACK ROOT and ROOT ROT (undetermined). This condition or group of troubles was reported as follows: Massachusetts, "Less than in 1934. There is increasing evidence that injury may be reduced by observing proper cultural practices before setting new beds to insure vigor and growth. Injury is usually less conspicuous in a bearing season characterized by a copious soil moisture supply." New Jersey, "Causing considerable damage in some places." Pennsylvania, "Becoming more abundant, control measures needed." Michigan, "Losses high in some plantings." Wisconsin, "Less prevalent." Minnesota, "Much less than in 1934 and less than in an average year, snow protected plants well, resulting in very little winter injury." California, "San Joaquin County added as a new center, elsewhere more severe than usual probably on account of wet season." Losses estimated were Maryland, 15 percent; Pennsylvania, 10; Iowa, Montana, and Oregon, 5; Tennessee, 2.5. New York and Washington also reported this trouble.

FRUIT ROTS (various causes). Tennessee reported an estimated loss of 8 to 10 percent from fruit rots in field and pack. In Louisiana losses from rot in the field were very small due, no doubt, to the relatively dry cool weather during the picking season. In Arkansas the common fruit rots were very plentiful and in addition a peculiar characteristic type of rot was especially prevalent on the Blakemore variety.

LEAF SCORCH (non-parasitic). New Jersey.

VARIEGATION (cause unknown; also known as "suspected mosaic", "June yellows", "yellow leaf"). This condition considered by many to be the expression of a genetic defect but by some suspected to be of virus origin, was reported from Massachusetts, New York, Tennessee, Arkansas, Minnesota, and Louisiana. "Xanthosis" reported as occurring locally on Blakemore in Missouri may be the same trouble. If so it is the first report from that State. The disease appears to be confined to certain varieties. All but two of the States reporting the trouble mentioned Blakemore as especially susceptible. Other varieties named as subject to the abnormality are Howard 17, Seedlings, Minnesota 3.

WEATHER INJURY. Connecticut, Louisiana, and Texas reported crown injury and winter killing due to severe winter weather. In Louisiana freezing injury and _Sclerotinia_ together were responsible for a very poor crop. (Plant Disease Reporter 19:132-134).

GRAPE. See VITIS sp.

LOGAN BLACKBERRY. See RUBUS sp.

LOQUAT. See ERIOBOTRYA JAPONICA

MALUS SYLVESTRIS. APPLE

FRUIT SPOT (_Alternaria_ sp.) in storage. In New Jersey red lesions on the Golden Delicious variety were associated with _Alternaria_. _Cladosporium_ sp. and _Alternaria_ sp. caused small sunken, brown spots about the lenticels on Ohio Rome beauty apples observed in Chicago in January according to G. B. Ramsey (Plant Disease Reporter 19:106).

STORAGE ROT (_Alternaria_ sp.). Massachusetts.

ROOT ROT (_Armillaria mellea_) is said to cause heavy damage in the sandhill area of North Carolina. According to R. F. Poole there is evidence that deficiency diseases are contributing factors in the development of this root rot. It was also reported from Pennsylvania.

FRUIT ROT (_Botrytis_ sp.). Massachusetts.

LEAF SPOT (Cercospora mali). Alabama and Texas.

FRUIT SPOT (Cladosporium sp.). Ohio (See Alternaria). FRUIT ROT, Massachusetts.

FOLIAGE SPOTTING (Coniothyrium sp. and Macrosporium sp.) appeared in abundance on foliage in Delaware wherever heavy sprays of arsenicals had been applied, apparently following spray injury. Specimens of foliage with similar history bearing Coniothyrium pyrinum were received from Tennessee.

HYPOCHNOSE (Corticium stevensii). Mississippi.

CANKER (Cytospora sp.) accompanying winter injury was observed in Washington.

WOOD DECAY (Fomes applanatus). Connecticut.

SOOTY BLOTCH (Gloeodes pomigena) was noted in Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Illinois, Minnesota, and Missouri. Injury generally was very slight except in unsprayed or imperfectly sprayed orchards. In Illinois it was observed in only one orchard where there was 56 percent infection of Paragon winesap. Minnesota also reported only one record. In Pennsylvania, however, there was much more than usual. R. S. Kirby reports a loss of 2 percent and states that "Sooty blotch was more severe than for the past seven years. The average in unsprayed orchards was 46.6 percent."

BULL'S EYE ROT (Gloeosporium perennans). G. B. Ramsey reported that shipments of Yellow Newton apples from the Northwest were received on the Chicago market showing a rather high percentage. (Plant Disease Reporter 19:106).

BITTER ROT (Glomerella cingulata) occurred in New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Tennessee, North Carolina, South Carolina, Mississippi, Texas, Arkansas, Ohio, Illinois, and Missouri. In South Carolina 10 percent loss was estimated by G. M. Armstrong and W. C. Nettles. J. O. Andes in reporting a 9 percent loss in Tennessee stated that "Spraying in connection with orchard sanitation was 90 percent effective." Other states estimating injury above 1 percent were Texas, 3; and Maryland and Ohio, each 2.

RUSTS (Gymnosporangium spp.). Apple rust, G. juniperi-virginianae, was of more than average prevalence in many states where it is usually an important disease. Much more than usual was reported from Ohio, West Virginia, and North Carolina, and more than average in New York, New Jersey, Virginia, Tennessee, Arkansas, and Missouri. In Connecticut, Maryland,

Mississippi, Illinois, Wisconsin, and Minnesota there was the usual amount. New Hampshire, Massachusetts, and Iowa reported less, and Kansas much less, than normal. The quince rust, G. clavipes, was reported specifically from Massachusetts, New York, West Virginia, Tennessee, Illinois, and Michigan; and the hawthorn rust, G. globosum, from Vermont, New Hampshire, New York, and Illinois (on wild crab apple). Losses of 1 percent or more reported as due to rust are 2.5 percent in West Virginia, 2 in Virginia and North Carolina; 1.5 in Tennessee; and 1 in Massachusetts, Connecticut, Ohio, and Wisconsin. Some of the comments of collaborators are as follows: Massachusetts: "Despite early-season wet weather and an unusually large crop of cedar galls, there was less rust in commercial orchards from the common apple rust and from hawthorn rust than even in the average year, probably because of late maturity of the cedar apples. Quince rust was about normal in amount." (Boyd) "Good control from sulphur sprays in some orchards." (Gilgut). New Jersey: "Very severe and general but in some orchards there was only slight infection of fruit even though leaf infection was abundant." (Department of Plant Pathology). Virginia: "Prolonged rains and attendant high humidity, and temperatures between 50° and 60° F. favored infection. Severe in regions where cedar trees are present but materially reduced in northern Virginia as a result of the cedar cutting campaign of the past winter." (A. B. Groves). West Virginia: "Heavy early rains were favorable for spore discharge and infection. Cedar rusts, both apple and quince, are gradually increasing as a result of a new crop of cedar trees that have grown since eradication ten years ago. The perennial quince rust cankers on young cedar trees are common. The varieties Stayman, Delicious, Winesap, Rome Beauty, and Jonathan are very susceptible to quince rust." (Schneiderhan) Tennessee: "Prolonged rainy periods and cool weather previous to, during, and after the blooming period resulted in more cedar rust development in most parts of the State than for several years. Leaf infections were 100 percent in some varieties. Quince rust was very prevalent. In one orchard where counts in June showed 40 percent fruit infection with quince rust, September counts showed only 5. Apparently a large proportion of infected fruit dropped before maturity." (E. M. Prather, J. O. Andes, Paul R. Miller). North Carolina: "Rust was more severe than at any time during the past ten years. There were three heavy spore discharges, the last one after the fruit was well exposed. Red Delicious, Stayman, and Winesap varieties remained immune." (R.F. Poole). Arkansas: "Favored by excessive rainfall in April and May; appeared on leaves May 4, overshadowed by scab injury. Some leaves with from 75 to 100 aecia were seen. Noted again as cankers on Early Red Bird nursery stock in September with active black rot (Physalospora obtusa) surrounding each lesion." (M. A. Smith and John C. Dunegan). Ohio: "More generally severe throughout the southern part of the State than ever before." (H. C. Young). Illinois: "Apple rust of about usual prevalence. Quince rust first observation, found in western apple regions where it caused far more damage than apple rust, on Red and Golden Delicious, Jonathan, Willow Twig, and Winesap, about 42 percent infection in infected orchards; 0.5 percent of fruit attacked." (H. W. Anderson, L. R. Tehon). Michigan: "Quince rust was very severe in one Delicious orchard in Washtenaw County--100 percent infection, near cedar trees. Loss in this orchard, 10 percent." (D. Cation). Minnesota: "Only near cedars. Heavy

rains in spring favored infection. Wealthy trees in one old orchard were 100 percent infected. There was not room for any more lesions on the leaves, but there was very little fruit infection." (C. J. Eide). Missouri: "Heavy rain in April and May favorable. More prevalent than usual but of no commercial importance so far as the fruit was concerned." (M. A. Smith). Kansas: "Because of the drought of 1934 there was less infection in 1935." (L. E. Melchers).

BLACK POX (Helminthosporium papulosum) was reported from West Virginia as a trouble formerly included under the measles complex but now recognized as distinct.

FLY SPECK (Leptothyrium pomi). In North Carolina fly speck is well controlled in orchards receiving the usual spray mixtures; but is prevalent on unsprayed or poorly sprayed trees and is therefore abundant in nearly all home orchards. In Minnesota the disease was seen only once, on Northwestern Greening in an old orchard. Fly speck was also reported from New York, New Jersey, Maryland, and Wisconsin.

FRUIT SPOT (Mycosphaerella pomi /Phoma pomi/) was said to be more abundant in Massachusetts than for many years. According to O. C. Boyd unusually rainy weather in June might have been a factor. Much more than usual was reported from Delaware also. In most of the other States reporting on this disease, including Connecticut, New York, New Jersey, Pennsylvania, Maryland, and Ohio, there was the usual amount or less. Losses were negligible.

SURFACE BARK CANKER (Myxosporium corticolum) was reported from New Jersey where it was said to be very severe on Jonathan, Winesap, Missouri Pippin, Gravenstein, Duchess, McIntosh, and Twenty Ounce.

BLISTER CANKER (Nummularia discreta). New York, Missouri, and Kansas. M. A. Smith reported that this disease is so general in the southern half of Missouri that it is causing the death of hundreds of trees annually, although most of these are older trees and past their best bearing years. L. E. Melchers wrote that it has been becoming less troublesome in Kansas and is no longer of much importance as the more susceptible varieties are not being grown and better care and pruning are given the orchards.

FRUIT ROT (Penicillium spp.) was reported from Massachusetts, New York, New Jersey, Pennsylvania, Missouri, and Washington. P. expansum was named as the species active in the four States last listed.

BLOTCH (Phyllosticta solitaria) was reported from New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Tennessee, North Carolina, Mississippi, Texas, Arkansas, Ohio, Illinois, Wisconsin,

Missouri, and Kansas. In most cases prevalence was average or less, and the disease was not important except locally. Poorly sprayed orchards of Northwestern Greening often suffer 90 to 95 percent loss in West Virginia, according to F. J. Schneiderhan. This variety was reported by A. B. Groves as especially susceptible in Virginia also. Blotch is an important factor in apple growing in the eastern part of North Carolina, according to R. F. Poole, and in 1935 it was abundant on both twigs and fruit of susceptible varieties. R. E. Vaughan reported that wild apples in southwestern Wisconsin were severely attacked. Reduced prevalence of the disease in Arkansas and Missouri was attributed to cool weather in April and May; in Mississippi and Kansas to dry weather. Blotch was not observed in Iowa in 1935. One new infection was observed in New York, in Clinton County on McIntosh trees from the South, according to W. D. Mills. The two cases previously reported from Wayne County remained quiescent. Losses of 1 percent or more reported were 5 percent in Texas; 2 percent in Illinois and Tennessee; 1 percent in South Carolina and Arkansas.

BLACK ROT (Physalospora obtusa) was reported from Massachusetts, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, Tennessee, North Carolina, South Carolina, Mississippi, Texas, Arkansas, Ohio, Illinois, Wisconsin, Minnesota, Iowa. Melchers stated that "Because of drought and unfavorable conditions in 1934 there was no infection in Kansas in 1935." The northeastern and north central States generally reported greater than average prevalence but loss estimates ranged only from a trace to 1 percent except in Massachusetts, where in addition to 1 percent reduction in yield from frog eye a loss of 1 percent from fruit infections in storage was reported, and in Maryland where the loss in storage was set at 1.5. In some sections of Illinois the prevalence of the leaf spot evidently affected the size of the fruit. The black rot organism, in association with Schizophyllum sp., was responsible for considerable wood rot of winter-injured branches and trunks in imperfectly pruned orchards in Massachusetts.

POWDERY MILDEW (Podosphaera leucotricha) was reported only from New York (usual prevalence), Washington, and from California where as usual it appeared in abundance in the Pajaro Valley but less commonly in the Sebastopol area and elsewhere which is also usual.

SAPPY BARK (Polystictus versicolor) was reported from California by H. Earl Thomas as usually prevalent on weak trees, aggravating dieback and heartrot.

SILVER LEAF (Stereum purpureum). New York.

WOOD DECAY (Stereum sp.). New Jersey.

SCAB (Venturia inaequalis). With few exceptions the States reported scab as much more prevalent than in 1934 or in average years. The extreme

drought of 1934 reduced the initial inoculum but favorable weather for the development and spread of the disease prevailed in most of the apple producing areas of the central and eastern parts of the country and generally speaking 1935 was the worst scab season for many years. However, Nebraska reported no early infection, the first severe infection occurring very late, and Kansas had practically no scab because of the severe drought of 1934. In the Watsonville apple district of California, H. Earl Thomas reported "General light foliage infection on Yellow Newton and White Winter Pearmain, less on Yellow Bellflower. Occasional slight infection on fruit." In Indiana and Missouri scab lesions developed on young wood. Such infection is very uncommon in the Middle West, and this was the first time that it had been observed in either State. In New Jersey, Virginia, West Virginia, and Wisconsin late rains caused scab infection which developed in storage. In West Virginia, according to Schneiderhan, there was more storage infection than for ten years past. Loss estimates were generally higher than usual although several states reporting severe scab did not give percentage injury. Maine and Pennsylvania each estimated 30 percent; Arkansas, 25; Tennessee, Illinois, and Michigan, each 20; Virginia and Wisconsin, each 15; West Virginia and Missouri, each 10; Massachusetts, 8; Maryland, 6; South Carolina and Oregon, each 5; Minnesota, 4; Connecticut, 3; Vermont, 2; Montana, 1; and North Dakota, trace.

BLACK ROOT ROT (_Xylaria_ spp.). A. B. Groves reports _X. mali_ as causing heavy losses of older trees in Virginia. In Virginia and Tennessee drought injury was considered to be an important contributing factor. F. J. Schneiderhan states that black root rot due to _X. mali_ and _X. polymorpha_ is the most important and destructive root disease of the apple in West Virginia where it is widely distributed. He reports also that all rootstocks commonly used are susceptible, and that trees killed by this disease can not be replaced because the organisms are long lived in the soil. _X. mali_ was reported from Indiana, where it occurred in the Purdue Experimental Orchard. It had not been observed in Indiana for several years.

BLIGHT (_Bacillus amylovorus_). The following thirty states reported blight on apples: Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Mississippi, Texas, Arkansas, Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, Kansas, Montana, Wyoming, Arizona, and California. Indiana, Arkansas, and Missouri indicated prevalence above the average and more than last year. In Kentucky the outbreak was "the worst in years". Blight was said to be very severe in New Jersey. New York, Virginia, West Virginia, Tennessee, and Kansas reported less than in 1934 or in an average year.

CROWN GALL (_Bacterium tumefaciens_) occurred in about the usual prevalence. It was reported from New York, New Jersey, Maryland, Mississippi, Texas, Wisconsin, Minnesota ("not seen, but probably quite a bit in nurseries"), Iowa, and Kansas. Washington reported a case of aerial galls thought to be crown gall but not definitely identified.

MEADOW NEMATODE (Anguillulina pratensis). California.

ROOT KNOT (Heterodera marioni). Mississippi and Texas.

MEASLES (undetermined). This condition or group of somewhat similar related troubles variously designated as measles, rough bark, internal bark necrosis, or target canker is apparently either becoming more prevalent or is being more generally recognized. The Delicious variety is almost universally mentioned as especially susceptible although other varieties are subject to the trouble. It was reported in 1935 from New York, New Jersey, Virginia, West Virginia, Mississippi, Ohio, Illinois, and Missouri.

MOSAIC (virus). New York and Washington.

ROSETTE (undetermined). New York, Clinton County.

BITTER PIT (non-parasitic) occurred in the usual amount in Vermont and New York and with more than average prevalence in Maryland. New Jersey reported that this trouble was very severe on Jonathan, Nottingham, Stayman, Winter Banana, and Rome varieties, with many instances reported from storage. In Delaware the usual amount appeared on Jonathan and in North Carolina it was very abundant and severe on trees that were heavily fruited. Wisconsin observed the usual amount and California recorded its presence in Butte and Kern Counties.

WATER CORE (non-parasitic). New York, New Jersey, and Delaware.

CHEMICAL INJURY (fumes). New Jersey.

SPRAY INJURY appeared more prevalent than in average years. It was reported from Massachusetts, Connecticut, New York, New Jersey, Delaware, and West Virginia.

WEATHER INJURIES:

Distorted growth. Various abnormalities in the fruit attributed to unfavorable weather were reported as follows: Cork, New York and New Jersey; second growth, New Jersey; cracking, russetting, puckering, West Virginia.

Drought injury was reported from Arkansas and Massachusetts where it was expressed in the greater prevalence of various non-parasitic disorders.

Hail injury was reported from Vermont, New York, and New Jersey.

Frost injury injured the set in New York and Arkansas.

Sun scald (non-parasitic). New Jersey and Washington.

Winter injury was reported from Vermont, Massachusetts, Connecticut, New York (Champlain Valley), Virginia, Wisconsin (associated with previous drought), and Washington. In New York the delayed effects of the 1934 freeze were evident, especially on the Rhode Island Greening variety in the western part of the State.

M O R U S spp. M U L B E R R Y

LEAF SPOT (Cercosporella mori). Texas.

LEAF SPOT (Phleospora maculans). Texas.

ROOT ROT (Phymatotrichum omnivorum). Texas.

POP CORN DISEASE (Sclerotinia carunculoides). Texas.

BLIGHT (Bacterium mori). California.

MOSAIC (virus). New Jersey.

MULBERRY. See MORUS

NECTARINE. See AMYGDALUS PERSICA NECTARINA

PEACH. See AMYGDALUS PERSICA

PEAR. See PYRUS COMMUNIS

PINEAPPLE. See ANANAS SATIVUS

PLUM. See PRUNUS spp.

PRUNE. See PRUNUS DOMESTICA

P R U N U S A R M E N I A C A. A P R I C O T

ROOT ROT (Armillaria mellea). Texas.

SCAB (Cladosporium carpophilum). Texas.

PUSTULAR SPOT (Coryneum beijerinckii). Indiana.

CANKER (Cytospora sp., provisionally, leucostoma). Arizona.

ROOT ROT (Phymatotrichum omnivorum). Texas.

BROWN ROT (*Sclerotinia cinerea*). California. "More severe than for many years - rain in blossom period and carry over from 1934 contributing factors." (Scott and Stout).

BROWN ROT (*Sclerotinia fructicola*). Texas.

GREEN ROT (*Sclerotinia sclerotiorum*). California, general, much more prevalent than usual.

RUST (*Tranzschelia pruni-spinosae*). California.

POWDERY MILDEW (undesignated). California, appeared in October.

BLIGHT (*Bacillus amylovorus*). Texas.

BACTERIAL GUMMOSIS (*Bacterium cerasi*). California.

BACTERIAL SPOT (*Bacterium pruni*). Texas.

CHLOROSIS (excess lime). Texas.

WINTER INJURY. Washington.

PRUNUS DOMESTICA (in part). PRUNE

BROWN ROT (*Sclerotinia cinerea*). Washington.

BROWN ROT (*Sclerotinia* sp.) was more important than usual in California, according to Scott and Stout. It attacks clusters of fruits but does not cause much loss except in lowering the grade of dried prunes. Occasionally there is some blossom blight.

SILVER LEAF (*Stereum purpureum* ?). Washington.

DIAMOND CANKER (undetermined). California.

LEAF SPOT (non-parasitic). Washington.

WEATHER INJURY. Russet on fruit in Washington occurred as the result of frost.

PRUNUS spp. CHERRY

ROOT ROT (*Armillaria mellea*). Washington.

SCAB (*Cladosporium carpophilum*). Iowa and Washington.

LEAF SPOT (Coccomyces hiemalis) was prevalent and in many sections severe. Losses ran very high in some states. Arkansas estimated 50 percent; Tennessee, 35; Michigan 20; Missouri, 20 on sour cherries and 15 on sweet cherries; Wisconsin, 7; Ohio and Illinois, each 5; Maryland, 3 (on sour cherry); West Virginia, 2. Other States, including New Hampshire, Massachusetts, Connecticut, New Jersey, Pennsylvania, Delaware, Virginia, Mississippi, Iowa, Kansas, Montana, Washington, Oregon, and California, reported from a trace to 1 percent or gave no estimates.

BLIGHT (Coryneum beijerinckii). Washington.

BLACK KNOT (Plowrightia morbosa). New York, New Jersey (very severe), Virginia (considerable damage done in some places), Tennessee, and Wisconsin.

POWDERY MILDEW (Podosphaera oxyacanthae). New York, New Jersey, and Pennsylvania.

BROWN ROT (Sclerotinia fructicola). Massachusetts, New York, Virginia, West Virginia, and Michigan each mentioned that losses were particularly heavy on sweet cherries. Loss estimates above 1 percent were given as follows: Massachusetts, 20 percent (sour cherries only 1); Pennsylvania, 15; Maryland (sour cherries), Illinois, and Oregon, each 5; Texas, Michigan, and Iowa, 3; Connecticut, 2. Other states reporting the disease were New Jersey, Tennessee, Mississippi, Arkansas, Wisconsin, Kansas, Washington, and California.

SILVER LEAF (Stereum purpureum). An unusual outbreak occurred in one young sour cherry orchard in Orleans County, New York. (Plant Disease Reporter 19:236).

WITCHES BROOM (Taphrina cerasi). Washington.

POCKETS (Taphrina deformans). Texas.

BACTERIAL SPOT (Bacterium pruni). New York, New Jersey, Texas, and Wisconsin.

CANKER (Bacterium pruni). This organism appeared as the causal agent in a stem canker on sweet cherry nursery stock in Missouri.

SHOOT BLIGHT (Bacterium syringae) caused a loss of 5 percent on sweet cherry nursery stock in a Missouri nursery. Bing and Schmidt's Bigarreaux were highly susceptible to this disease, which seems to be new to Missouri.

CROWN GALL (Bacterium tumefaciens). Texas and Washington.

BUCKSKIN (virus). Washington.

MOSAIC (virus). Washington.

LEAF DROP (non-parasitic). New York.

DRY STEM (arsenical injury) was reported from New York. Severe injury of Morello cherries occurred in one case where a grower used three pounds of calcium arsenate in the last spray; otherwise injury was slight.

WITCHES BROOM (undetermined). New Jersey.

WINTER INJURY. Dying of trees or severe injury was reported from Massachusetts, New York, New Jersey, Wisconsin, Kansas, and Washington. The loss of crop for both black and red sweet cherries in Massachusetts was set at 80 percent. In Kansas many trees died due to the combined effect of the series of drought years and the low temperatures--new orchards must be planted.

P R U N U S spp. P L U M

SCAB (*Cladosporium carpophilum*). Wisconsin.

LEAF SPOT (*Coccomyces prunophorae*). Maine, New York, Illinois, Minnesota, Missouri, and Kansas. This disease was much more common than usual in Illinois and in Missouri where the loss was estimated at 10 percent.

BLACK KNOT (*Plowrightia morbosa*) was reported from Massachusetts, "increasing, serious in unsprayed cases"; New York; New Jersey, "Very severe"; Pennsylvania, 2; Maryland, 2; Virginia, "causing considerable damage in some places"; Mississippi; Texas. In Minnesota and Iowa it was only observed on wild plums. Illinois and North Dakota each reported that the disease was "not seen this year".

BROWN ROT (*Sclerotinia fructicola*) appeared in New Hampshire, Massachusetts, 5 percent loss; New York, usual amount but more than in 1934; Pennsylvania, 11; Maryland, much more, 7; Mississippi, less than last year or in an average year; Texas, 3; Ohio, much more, 6; Indiana, more, 10; Illinois, more than last year, usual amount, 2; Wisconsin, less than usual; Minnesota, much more than in 1934, much blossom blight seen, average amount of fruit rot; Iowa, more than usual, 5; Missouri, much more, 5; Kansas, much less than in an average year; California, "general, one orchard observed with 90 percent blossom blight".

HYPERTROPHY (*Taphrina mirabilis*). Mississippi and Louisiana.

POCKETS (*Taphrina pruni*) was said to be much more abundant in West Virginia than in 1934 or in an average year. It was generally prevalent in the Monongahela Valley area. In Wisconsin, there was the usual amount which was less than in 1934. It occurred extensively on wild plums in the central and northern parts of the State. In Minnesota there was much more than last year and more than usual, mostly on native plums in the northern part. A loss of 5 percent was estimated. Iowa reported more than usual and 1 percent loss; Missouri, a trace; North Dakota, less, 1 percent loss. In Wyoming 20 percent loss was observed in one orchard. Texas reported 2 percent loss.

RUST (*Tranzschelia pruni-spinosae*) was reported from Missouri where it was said to be much more prevalent than usual but caused only a trace of loss; and from Texas.

CANKER (*Valsa leucostoma*). Texas.

BACTERIAL SPOT (*Bacterium pruni*). Leaf spot and canker were very severe on the Golden Jubilee variety in a nursery in Knox County, Tennessee. Large cankers which girdled the stems and killed them occurred on all trees in one block. Maryland reported 7 percent loss; Texas, 2; Ohio, 1. The disease was also reported from New Jersey, Illinois, and Wisconsin.

CROWN GALL (*Bacterium tumefaciens*). Maryland, Mississippi, and Texas.

SHOT HOLE (undetermined). Wyoming.

LEAF DROP (non-parasitic). New York.

SPRAY INJURY. Massachusetts, Connecticut, and New York.

WEATHER INJURY. Freezing injury occurred in Texas and extensive dying of trees due to drought and summer heat during the past two or three years was reported from Kansas.

P Y R U S   C O M M U N I S.   P E A R

STORAGE ROT (*Botrytis cinerea*). Massachusetts.

CROWN GIRDLE (*Dothiorella ribis*) appeared again with about the usual prevalence in Louisiana where it has been under investigation during the past four years.

LEAF SPOT (*Fabraea maculata*). This leaf spot like many others appears to have been unusually prevalent in 1935. Early and almost complete defoliation occurred in unsprayed orchards in Louisiana, Arkansas, and Missouri. Losses estimated were 5 percent in Illinois, 4 in Pennsylvania,

3 in Indiana, 2 in Ohio, Missouri, and Maryland, traces in Michigan, Virginia, West Virginia, and North Carolina. New York, New Jersey, Delaware, and Tennessee also reported the disease.

SOOTY MOLD (Fumago vagans). New Jersey.

SOOTY BLOTCH (Gloeodes pomigena). New Jersey.

BITTER ROT (Glomerella cingulata). Massachusetts.

QUINCE RUST (Gymnosporangium clavipes). Texas.

RUST (Gymnosporangium libocedri). M. R. Harris reported this rust as occurring in Nevada County, California, on the young fruits and leaf petioles.

LEAF SPOT (Mycosphaerella sentina) was more prevalent than usual in New York and about average in Illinois, but occurred only sparingly in Mississippi, Texas, and Kansas.

STORAGE ROT (Penicillium expansum). Massachusetts.

BLACK ROT (Physalospora obtusa). New Jersey, Texas, and Illinois. In Illinois it was seen only once, in Pulaski County on one fruit out of 2,000 examined.

BROWN ROT (Sclerotinia fructicola). New Jersey.

CANKER (Septobasidium retiforme). Mississippi and Texas.

SILVER LEAF (Stereum purpureum). One affected tree was noted in Monroe County, New York.

SCAB (Venturia pyrina). W. D. Mills reported about the same amount as in 1934 in the Hudson Valley of New York. In western New York, however, there was more, except in Wayne County where the disease was epiphytotic two to four years ago and was checked by the use of special sprays. More than the average was reported from Virginia, Ohio, and Wisconsin, and from Sonoma and Mendocino Counties in California; less in Maryland, and much less in Kansas. Scab was said to be common, as usual, in northern Illinois, and was of average prevalence in Connecticut and Wisconsin also. A loss of 6 percent was reported in Oregon; 3 in Maryland; 2 in Ohio; 1 in Pennsylvania; and a trace in Massachusetts, Virginia, and Illinois. Washington also reported its occurrence.

BLIGHT (Bacillus amylovorus) was reported generally where pears are grown. Losses estimated were 90 percent in Tennessee, 8 in Pennsylvania;

7 in Maryland; 5 in Texas and Indiana; 2 in Illinois and Iowa; and 1 in Oregon. It was much more prevalent than in 1934 or in an average year in Delaware, Maryland, and Tennessee; more prevalent in Illinois and Indiana; and less prevalent in New York, Virginia, Louisiana, Kansas, and California. A few characteristic comments follow: New York, "Too dry early in the season, between and during bloom, too cool for maximum disease development and insect activity", (E. M. Hildebrand). Delaware, "late in appearing but developing to epidemic destructiveness", (J. F. Adams). Virginia, "The very susceptible Seckel escaped with only moderate injury in 1935", (A. B. Groves). Tennessee, "Blight was very severe. I do not recall seeing any pear fruit this year," (J. O. Andes). Arkansas, "Very prevalent." (Department Plant Pathology). Indiana, "Serious on young seedling stock in nursery." (J. A. McClintock). California, "Generally wet weather at blossom time but too cold for much insect activity." (H. Earl Thomas).

FRUIT ROT (Bacillus carotovorus). Massachusetts.

BLAST (Phytomonas sp. /green fluorescent/). Little of this disease was seen in California in 1935, according to H. Earl Thomas.

BUD DROP (non-parasitic). Washington.

CHLOROSIS (excess lime). Texas.

FRUIT SPOT, amoeboid (undetermined). Washington.

MARGINAL BURNING (undetermined). Washington.

OEDEMA (disturbed water relation). Washington.

ROUGH BARK (non-parasitic). Washington.

WEATHER INJURY. Massachusetts reported poor pollination due to frost and cool spring weather, and in New York cuts or splits on the fruit were attributed to frost injury.

QUINCE. See CYDONIA OBLONGATA

RASPBERRY. See RUBUS sp.

R U B U S spp. B L A C K B E R R Y

ROOT ROT (Armillaria mellea). Texas.

FRUIT ROT (Botrytis cinerea) was especially severe in Massachusetts where the loss was estimated at 10 percent.

ROSETTE (_Cercosporella_ sp.). Louisiana.

ANTHRACNOSE (_Elsinoe veneta_). According to Davis and Boyd, anthracnose has increased in severity in Massachusetts, following the severe winter of 1933-34, and in 1935 there was much more than usual. There was more than usual in New York also. Kansas reported more than last year but less than usual. Anthracnose was reported from Washington also.

ORANGE RUST (_Gymnoconia peckiana_) was reported from Massachusetts, New York, New Jersey, Delaware, District of Columbia, Tennessee, Texas, Illinois, Wisconsin, Minnesota, Kansas, and Washington. In Tennessee it caused considerable loss in some cultivated fields.

YELLOW RUST (_Kuehneola uredinis_). Massachusetts.

ORANGE RUST (_Kunkelia nitens_) was said to be common and destructive in Arkansas.

CANE BLIGHT (_Leptosphaeria coniothyrium_) was reported as especially bad this year in Massachusetts. Texas also reported the disease.

LEAF SPOT (_Mycosphaerella rubi_). New Jersey, Texas, and Kansas.

SPUR BLIGHT (_Mycosphaerella rubina_). Washington.

POWDERY MILDEW (_Sphaerotheca humuli_). New Jersey.

BLUE STEM (_Verticillium alboatrum_). New York.

MOSAIC (virus). New Jersey and Washington.

WINTER INJURY. A trouble developing in mid-summer in New Jersey was regarded as a delayed response to winter injury.

R U B U S sp. D E W B E R R Y

ROSETTE (_Cercosporella_ sp.). Louisiana.

ANTHRACNOSE (_Elsinoe veneta_). New Jersey and Texas.

ORANGE RUST (_Gymnoconia peckiana_). New Jersey and Texas.

ORANGE RUST (_Kunkelia nitens_). Connecticut.

CANE BLIGHT (_Leptosphaeria coniothyrium_). Louisiana and Texas.

LEAF SPOT (_Mycosphaerella rubi_). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

CHLOROSIS (excess lime). Texas.

RUBUS sp. LOGAN BLACKBERRY

LEAF SPOT (*Mycosphaerella rubi*). Washington.

RUBUS sp. RASPBERRY

FRUIT ROT (*Alternaria* sp.). Massachusetts and New Jersey.

ROOT ROT (*Armillaria mellea*). Washington.

BLIGHT (*Botrytis* sp.) caused the death of many canes in New Jersey. Sclerotia of *Botrytis* were abundant under the epidermis.

GRAY MOLD ROT (*Botrytis cinerea*). Massachusetts and New Jersey.

SPUR BLIGHT (*Didymella applanata*) occurs in small amounts in nearly every field in Minnesota, according to C. J. Eide.

ANTHRACNOSE (*Elsinoe veneta*) was generally more important than usual. This was true in Massachusetts, New York, Maryland, Ohio, Iowa, and Missouri. Losses of as high as 50 to 75 percent occurred in eastern Maryland according to G. M. Darrow. In Pennsylvania there was less than usual but this was due to the more general application of control measures following extensive losses in 1934. The normal amount was reported from Wisconsin and Minnesota, and from Arkansas, where anthracnose is one of the causes of abandonment of raspberry planting. The disease was reported as common in New Jersey and Virginia. Only slight infections were observed in North Carolina. West Virginia and Washington also reported its occurrence. Losses reported were 10 percent in Ohio; 5 in Maryland and Iowa; 3 in Pennsylvania and Kansas; 1 in Texas.

FRUIT ROT (*Fusarium* sp.). Massachusetts.

DOUBLE BLOSSOM (*Fusisporium rubi*). Maryland.

WHITE BUD (*Glomerella rubicola*). Illinois.

ORANGE RUST (*Gymnoconia peckiana*) was reported in the usual prevalence from New York, New Jersey, Pennsylvania, Maryland, Wisconsin, and Minnesota.

YELLOW RUST (*Kuehneola uredinis*). New Jersey.

CANE BLIGHT (Leptosphaeria coniothyrium) was reported from Massachusetts, especially bad, loss 15 percent; Connecticut, more than usual; New York; New Jersey, very severe in many plantings; Pennsylvania, mostly on weakened canes; Maryland, much more than in 1935 and more than in an average season, 4; Virginia, the most prevalent and destructive disease of raspberries in the State; Kentucky, most destructive disease of black raspberries in the State; Texas; Ohio, less prevalent though one entire planting of 2.5 acres was observed to be generally infected; North Dakota; and Kansas, less prevalent than usual.

LEAF SPOT (Mycosphaerella rubi). Massachusetts, New Jersey, Pennsylvania, Delaware, Texas, Iowa, and Kansas.

SPUR BLIGHT (Mycosphaerella rubina) was reported from Massachusetts, "perhaps the most common and injurious raspberry disease this season"; Pennsylvania, New York; New Jersey, severe on Latham; Texas, 5 percent loss; and Iowa, less prevalent.

WESTERN RUST (Phragmidium rubi-idaei). Washington.

ROOT ROT (Phymatotrichum omnivorum). Texas.

LEAF RUST (Pucciniastrum americanum). Vermont, Massachusetts, Delaware, North Carolina, and Wisconsin.

POWDERY MILDEW (Sphaerotheca humuli). New York, New Jersey, Pennsylvania, Minnesota, and California.

BLUE STEM (Verticillium albo-atrum). Massachusetts, New York, New Jersey, Pennsylvania, and Missouri.

CROWN GALL (Bacterium tumefaciens). Massachusetts, New York, New Jersey, Pennsylvania (fast becoming of major importance), Maryland, West Virginia, Kentucky, Ohio, Iowa, and Kansas.

LEAF CURL (virus). New York; Pennsylvania, "control measures have greatly reduced leaf curl"; Maryland, much less; Ohio, 4 percent; Wisconsin, Minnesota, North Dakota, and Washington.

MOSAIC (virus). Reports were received as follows: Massachusetts, "Less than in former years but loss estimated at 10 percent; the virus disease situation is the chief limiting factor in raspberry production"; New York, plentiful; New Jersey, "Very prevalent in Burlington County. In a field showing 85 percent infection the plants were reduced in size and height, some plants being only one foot high"; Pennsylvania, "Less prevalent due to control measures"; Arkansas; Ohio, less, 3; Wisconsin; Minnesota, general, more than last year, 15 percent loss, estimate based on fruit yields, not inspection; Iowa, 10; North Dakota; Kansas, very little seen; Washington.

STREAK (virus). Pennsylvania, "most dreaded disease in State"; Ohio, usual prevalence, 2 percent loss.

CROWN DISEASE (undetermined). A disease of the crowns involving a girdling of the canes at the base was reported from a few plantings in Massachusetts.

WEATHER INJURY, chiefly winter injury, but in some instances also associated with drought conditions, was reported from Massachusetts, New York, New Jersey, Pennsylvania, Kentucky, Wisconsin, Minnesota, Iowa, and Washington.

RUBUS sp. YOUNGBERRY (HYBRID DEWBERRY)

SPUR BLIGHT (*Didymella applanata*). Washington.

ANTHRACNOSE (*Elsinoe veneta*). Washington.

LEAF SPOT (*Mycosphaerella rubi*). Washington.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

CROWN GALL (*Bacterium tumefaciens*). Washington.

WINTER INJURY. Washington.

STRAWBERRY. See FRAGARIA sp.

VACCINIUM spp. BLUEBERRY

CROWN GALL (*Bacterium tumefaciens*). Washington.

DIEBACK (undetermined). Washington.

FROST INJURY. Twig blight and leaf blister developed in Washington as a result of frost.

VACCINIUM CORYMBOSUM. CULTIVATED BLUEBERRY

ANTHRACNOSE (*Gloeosporium* spp.). New Jersey.

BITTER ROT (*Glomerella cingulata*). New Jersey.

POWDERY MILDEW (*Microsphaera alni vaccinii*). New Jersey.

TIP BLIGHT (*Phomopsis* sp.). New Jersey.

BROWN ROT (Sclerotinia vaccinii). New Jersey. "Very bad on Grover variety and other late varieties throughout the State in commercial blueberry culture."

Several fungi found on the cultivated blueberry in Massachusetts, New Jersey, and North Carolina are reported by Marguerite S. Wilcox (Plant Disease Reporter 20:106-107).

V I T I S sp. G R A P E

ROOT ROT (Armillaria mellea). Texas.

LEAF BLOTCH (Briosia ampheloрhaga). Texas.

FRUIT MOLD, from which Cephalothecium sp. was isolated, was reported from Arizona, by J. G. Brown, who stated that the fungus had not previously been observed on grapes in that State.

DEAD ARM (Cryptosporella viticola) was reported from New York and for the first time from California. (Plant Disease Reporter 19:310).

ANTHRACNOSE (Elsinoe ampelina). New Jersey, Maryland, Florida, Mississippi, Texas, Arkansas, Iowa, and Puerto Rico; not very important.

RIPE ROT (Glomerella cingulata). New Jersey and Texas.

BLACK ROT (Guignardia bidwellii) was reported as prevalent and serious in many States. Figures following the State name in some cases indicate the estimated percentage loss. New Hampshire, 90; Massachusetts, 4; Connecticut; New York, "Serious in many vineyards. Growers who have been able to control black rot with one spray in the past are finding that they are not controlling the disease this year"; New Jersey, "severe in some plantings"; Pennsylvania, 15; Delaware; Maryland, 8; Virginia, 10, "Growers state that they are having difficulty controlling the disease with Bordeaux mixture"; South Carolina, 25; Tennessee, 40, "Unsprayed vineyards often a total loss. Spraying helped greatly. Soap as a spreader was always necessary for effective control"; Florida, 2; Mississippi, "less than usual"; Texas, 2; Arkansas, 25, "Estimate based on a great loss in quality as well as quantity. Many growers not able to market fruit except as juice"; Ohio, 4; Illinois, 5; Michigan; Wisconsin; Minnesota, "Only one report"; Missouri, "More; trace, in southern half"; and Kansas, "Much less than usual".

BITTER ROT (Melanconium fuligineum). The only report received was from Florida where there was less than usual, according to K. W. Loucks, who estimated a total loss of 10 percent of which half was reduction in yield. In one vineyard where no attempt had been made to control the disease 100 percent infection was observed.

ROOT ROT (Phymatotrichum omnivorum). Texas.

DOWNY MILDEW (Plasmopora viticola) was reported from New Hampshire, Massachusetts, Connecticut, New York, New Jersey, Maryland, Mississippi, Texas, Arkansas, Ohio, Michigan, Wisconsin, Minnesota, Iowa, and Puerto Rico. A loss of 8 percent was estimated in Iowa; 5 in Massachusetts; and 1 in Maryland, Texas, and Ohio.

POWDERY MILDEW (Uncinula necator). Connecticut, New York, Texas, Iowa, and Arizona, not important.

ROOT ROT (undetermined basidiomycetous fungus). Mississippi.

CROWN GALL (Bacterium tumefaciens). New York, Maryland, Texas, Minnesota, and Washington.

ROOT KNOT (Heterodera marioni). Arizona.

LEAF NECROSIS (undetermined). Washington.

RUSSET FRUIT (undetermined). Washington.

BRONZING (undetermined). Texas.

CHLOROSIS (excess lime). Texas.

CORKY CENTER (drought). Washington.

LIGHTNING INJURY. New Jersey.

WINTER INJURY. Massachusetts and New York.

YOUNGBERRY. See RUBUS sp.

D I S E A S E S   O F   N U T   C R O P S

ALMOND. See AMYGDALUS COMMUNIS

A M Y G D A L U S   C O M M U N I S.   A L M O N D

SCAB (Cladosporium carpophilum) was observed as a light leaf infection on one ranch in Napa County, California.

BLIGHT (Coryneum beijerinckii) was much more prevalent than usual locally in interior valleys of California. Late rains favored its development and resulted in severe damage to blossoms, leaves, and fruit. Defoliation of 50 percent was common.

CROWN ROT (Phytophthora citrophthora) was more severe in California than in 1934 and much more prevalent than in an average year. It is usually serious on nursery stock and on young trees in orchards the first year or two.

BROWN ROT (Sclerotinia cinerea) was very prevalent as a blossom blight in California plantings.

CROWN GALL (Bacterium tumefaciens) was observed generally in California in about the usual prevalence. In one nursery in Butte County in the spring of 1934 it was found on 85 percent of 10,000 trees.

A R A C H I S   H Y P O G A E A.   P E A N U T. See DISEASES OF SPECIAL CROPS

BUTTERNUT. See JUGLANS CINEREA

C A S T A N E A   D E N T A T A.   C H E S T N U T. See DISEASES OF TREES

CHESTNUT. See CASTANEA DENTATA. Under DISEASES OF TREES

C O R Y L U S   sp.   F I L B E R T,   H A Z E L N U T

POWDERY MILDEW (Phyllactinia corylea) was less prevalent than in 1934 in western Oregon and, apparently because of the lateness of the attack, did little damage where it occurred.

BACTERIAL BLIGHT (Bacterium sp.) was more prevalent and destructive than for many years in Washington and Oregon in both young and mature orchards. In some young plantings 10 to 15 percent of the trees under three years of age were killed from the effects of the disease. Mature trees suffered severely from the killing of buds and twigs.

BROWN STAIN (non-parasitic), a disorder of the nuts confined almost exclusively to the Barcelona variety, was present in the Pacific Northwest to a limited extent. Losses were estimated at 2 percent.

SHRIVEL (undetermined). This disorder which results in the failure of the embryo to develop was estimated to have caused a loss of 15 percent in the Pacific Northwest with injury in some orchards running as high as 35 percent.

WEATHER INJURY. Drought in Oregon adversely affected the filling of nuts. The abnormally high temperatures which prevailed in Washington and Oregon caused serious sun scald on young trees. Large cankers developed near the soil line on the southwest side of the trunks and many trees one or two years old were killed. Tip burn of the leaves was also a frequent occurrence.

HICORIA PECAN. PECAN

Reports on the occurrence of pecan diseases in 1935, by H. E. Parson for northwestern Louisiana, and by J. R. Cole for Georgia, Florida, Alabama, and Mississippi, were given in the Reporter 20:77-79, and should be consulted in connection with the following.

BROWN LEAF SPOT (Cercospora fusca) was abundant and destructive throughout North Carolina and was also reported from Georgia, Alabama, Mississippi, Louisiana, and Texas.

DOWNY SPOT (Cercosporella caryigena). Georgia, Alabama, Mississippi, and Louisiana.

SCAB (Cladosporium effusum) is said to be increasing on susceptible varieties in South Carolina, each year. In northern Georgia, Schley and Delmas were badly diseased with total loss of the crop of some trees. Less than usual was reported from Mississippi due to dry weather which prevented its development until late in the season when frequent rains in the coastal section allowed abundant infection. In Arkansas, scab was worse than in any year for at least twelve years, and there were some reports of almost total loss. Scab was reported from Florida, Alabama, Louisiana, and Texas, also.

LIVER SPOT (Gnomonia caryae var. pecanae). Mississippi, Louisiana.

VEIN SPOT (Gnomonia nerviseda). Louisiana.

POWDERY MILDEW (Microsphaera alni) was less prevalent than usual in Mississippi. In northern Louisiana it was very prevalent on nuts of the Pabst and Success varieties.

NURSERY BLIGHT (Phyllosticta caryae). Texas.

ROOT ROT (Phymatotrichum omnivorum). Texas.

MOUSE EAR (undetermined). Several new cases of this apparently non-parasitic trouble appeared in Jackson County, Mississippi. It occurs only on properties immediately adjacent to the coast.

ROSETTE (non-parasitic). Georgia, Mississippi, Louisiana, and Texas.

JUGLANS CINEREA. BUTTERNUT

LEAF SPOT (Gnomonia leptostyla). Michigan.

JUGLANS NIGRA. BLACK WALNUT

WILT (Fusarium sp.) caused a 10 percent loss in a planting of 5,000 trees in a nursery in Warren County, Tennessee, and seedlings one to two feet high in nursery rows at Spartanburg, South Carolina, and La Grange, Georgia, suffered 20 to 50 percent destruction with damping off and root rot symptoms.

LEAF SPOT (Gnomonia leptostyla) was less prevalent and later in reaching its maximum intensity in Michigan than in 1934 and much less prevalent than in an average year.

JUGLANS REGIA. PERSIAN WALNUT (ENGLISH WALNUT)

ANTHRACNOSE (Glomerella cingulata) appeared in traces in Texas.

BACTERIAL BLIGHT (Bacterium juglandis). Texas, Washington, Oregon, and California reported the presence of this disease. In Oregon losses varied from nothing to 35 percent with the loss for the State estimated to average not more than 3, one of the lowest estimates of record. Blight was general along the California coast. Glenn, Yuba, Placer, and Sacramento Counties in the interior of the State were added as newly reported localities.

LEAF SCORCH (non-parasitic). This disorder was observed in practically all Oregon plantings but it was particularly prevalent in the vicinity of Sheridan resulting in appreciable decrease of the functional leaf area, chiefly on soils ill-adapted to walnut culture.

WEATHER INJURIES. Drought has resulted in the loss of practically all walnut trees in the vicinity of Manhattan, Kansas. The prolonged dry weather of the season adversely affected the quality of the Oregon crop, resulting in many partially or completely shriveled meats, and premature yellowing and dropping of leaves particularly in orchards on lands with low

available moisture content. Sun scald or burn did much injury in Washington and Oregon where the intense heat was estimated to have caused at least a 5 percent loss. Die back due to winter injury was also reported from Washington.

PEANUT. See ARACHIS HYPOGEA under DISEASES OF SPECIAL CROPS

WALNUT, BLACK. See JUGLANS NIGRA

WALNUT, PERSIAN (ENGLISH). See JUGLANS REGIA

DISEASES OF VEGETABLE CROPS

ALLIUM CEPA. ONION

ALTERNARIA (*Alternaria* sp.) was prevalent in Massachusetts in association with blast and downy mildew.

ROOT ROT (*Aspergillus nidulans*). Texas.

BLACK MOLD (*Aspergillus niger*). New York, Texas, and apparently a new record for Puerto Rico.

NECK ROT (*Botrytis* spp.). Massachusetts, Connecticut, New York, Texas, and Wisconsin.

SMUDGE (*Colletotrichum circinans*). New York, trace; New Jersey; and Wisconsin, less than usual.

BULB ROT (*Diplodia* sp.). Texas.

PINK ROOT (*Fusarium solani* /*F. malli*/). Texas, 5 percent loss; Arkansas, rather common, results in poor growth, from young plants shipped in from Texas. (See also *Phoma terrestris*).

BULB ROTS (*Fusarium* spp.). Connecticut reported a wilt and rot; Texas a bulb rot. In New Jersey a considerable amount of bulb rot due to *F. oxysporum* f. 7 (*F. cepae*) occurred in some fields, and a basal rot caused by *F. cepivorum* affected 5 to 8 percent of the crop. In Iowa a bulb rot attributed to *F. vasinfectum* var. *zonatum* f. 1 caused a loss of 2 percent. It was less prevalent than formerly since fields infested with the pink root organism (*Phoma terrestris*) were not used for onions.

MOLD (*Macrosporium porri*) "is becoming more prevalent in New York with increase in acreage of late onions, particularly following wet years in California." Texas estimated 10 percent loss from leaf blight due to *Macrosporium* sp.

DOWNY MILDEW (*Peronospora destructor*) appeared in Massachusetts in July but the injury done by it was overshadowed by blast and blight damage. It was much more prevalent in New York than in 1934 or in an average year. Damage was serious in the counties where rain was abundant, mostly in central New York. Losses up to 80 percent in Madison County were traced to both soil and seed. The estimated loss for the State was 12 percent. Severe losses occurred in some plantings in New Jersey. Pennsylvania reported a trace. Downy mildew was more severe than usual in California. The greatest damage was to the seed crop in which 100 percent of the plants were frequently infected and the yield was reduced 50 percent or more in many cases. The variety Nebuka, or Japanese onion (*Allium fistulosum*), was said to be very resistant. The disease was not observed in Oregon during the season. In 1934 it was very severe on plantings grown for seed in the Williamette Valley. The difference is attributed to the abundance of rain in 1934 and its practical absence in 1935. (Plant Disease Reporter 19:142, 224, 226, 234, 245, 254).

PINK ROOT (*Phoma terrestris*). Reduced prevalence in New York and Ohio was said to be due to more frequent rains and consequent lower soil temperature; in Iowa to avoidance of infested soils. Three percent loss was estimated in New York and Iowa; 0.5 percent in Ohio. (See also *Fusarium solani*).

DAMPING OFF (*Pythium* sp.). One case was observed in Massachusetts. Heavy losses of young plants were reported in North Carolina.

WATERY SOFT ROT (*Rhizopus nigricans*). Texas.

WHITE ROT (*Sclerotium cepivorum*) was severe in one field in New Jersey. It occurs in several sections of the State but is not generally distributed.

STEM ROT (*Sclerotium rolfsii*). Texas.

ROOT ROT (*Thielaviopsis basicola*). Texas.

SMUT (*Urocystis cepulae*). In Massachusetts, smut was severe early in the season and caused 15 to 20 percent loss in stand since few growers treated seed in rows. In New York it is fairly well controlled in most places but is spreading to new areas. A loss of 5 percent was estimated. In Ohio there was less than usual with a loss of 3 percent. In Wisconsin there was more than usual probably due to dilution of formaldehyde by heavy rains after seeding. A loss of 2 percent was reported from Iowa.

SOFT ROT (Bacillus carotovorus). New York, Georgia, and Texas. In one field near Athens, Georgia, the disease caused 50 percent loss.

YELLOW DWARF (virus). Iowa and California.

WEATHER INJURY. Blast or sun scald was the outstanding disease of the year in Massachusetts particularly on the seed crop which was reduced by about 50 percent. It did more damage in New York than all other diseases combined on late onions, and was much more prevalent than usual in Ohio. It was reported from Washington. Losses reported were 40 percent in Massachusetts, 20 in Ohio, 10 in New York.

ALLIUM PORRUM. LEEK

BLACK MOLD (Macrosporium parasiticum). New Jersey.

PINK ROOT (Phoma terrestris). New York, traces on muck lands.

ALLIUM SATIVUM. GARLIC

BLACK MOLD (Aspergillus niger). Texas.

TIP BLIGHT (Macrosporium parasiticum). Texas.

ANETHUM GRAVEOLENS. DILL

BLACK SPOT (Phoma anethi). Connecticut.

APIUM GRAVEOLENS. CELERY

GRAY MOLD ROT (Botrytis sp.). New York, more prevalent than usual, severe in one storage on one lot of forty cars.

EARLY BLIGHT (Cercospora apii) was generally reported as more prevalent than usual. In Michigan, where celery is a crop of major importance, the outbreak was the most serious ever observed, according to R. Nelson, who continues, "Very high humidity from June 15 to August 1, with heavy fogs and dews on the marshes, and temperatures above normal especially at night, favored its development. The summer crop was almost a complete loss, and the total loss for the State is estimated at 35 percent. A few growers were successful in controlling the disease with dust and sprays. Timely and thorough applications were effective." J. G. Leach made a similar report for Minnesota, of frequent rains and high humidity resulting in the development of more early blight than had ever been observed in the State previously. In Ohio the disease was so severe that all or parts of many fields were abandoned and heavy losses were caused in many others, according to J. D. Wilson who also reported favorable conditions in heavy July and

August rains. Other States reporting greater than normal prevalence were Massachusetts, New York, Pennsylvania, Delaware, New Jersey, Wisconsin, and Iowa. In the Everglades section of Florida, on the other hand, rainfall was deficient and there was less early blight than usual, according to G. R. Townsend. Connecticut and California also reported the presence of early blight. Besides the 35 percent loss for Michigan, other loss estimates reported are 10 percent in Massachusetts and Ohio, 5 in Pennsylvania and Minnesota, and 1 in Iowa.

YELLOWS (Fusarium orthoceras apii and F. sp.) was reported from New York, where it was more prevalent than usual and appeared to be spreading in some sections. Resistant varieties are satisfactory. In Ohio, the disease was said to be becoming increasingly prevalent in late varieties. In Michigan the more general use of Michigan Golden in infested areas has reduced losses but there is a noticeable increase of yellows each year in commercial varieties which previously have been resistant. Some of the best sorts failed in 1935. Minnesota reported more than the average amount. Michigan Golden has been found very satisfactory although some growers reported it as more susceptible to damping off. Fusarium yellows was reported from Pennsylvania, Wisconsin and California also. Losses reported were 4 percent in Michigan and 3 percent in Ohio.

ROOT ROT (Phoma apiicola). New York, traced to seed bed in one case and on muck soil.

DAMPING OFF (Pythium debaryanum). New Hampshire.

PINK ROT (Sclerotinia sclerotiorum). Massachusetts, more severe, 5 percent; New York, trace on late crop where it had been severe in 1933; New Jersey; Pennsylvania; Michigan, destructive in the little celery of poor quality trenched.

LATE BLIGHT (Septoria apii and S. apii graveolentis) was destructive in some states as indicated by the following: Massachusetts, very little seen; Connecticut; New York, more, estimated loss 7 percent with 100 percent infection in some fields; New Jersey, severe in several sections; Pennsylvania, more, 13; Delaware, more prevalent; Ohio, 3; Michigan, more, heavy spring and summer rains favored early development but dry weather after August 1 prevented a more serious development in the late crop, loss, 6; Wisconsin, more; Minnesota, much more, favored by frequent rains and high humidity, 45; Iowa, trace; North Dakota, usual trace; California.

SOFT ROT (Bacillus carotovorus) was more prevalent than in 1934 or in an average year in Massachusetts. The loss was estimated at 10 percent. Very little was reported from New York and only a trace from Pennsylvania. In Michigan it caused some damage in storage largely because the widespread injury from leaf blights and heavy early frosts left celery in poor condition for storage.

BACTERIAL LEAF SPOT (Bacterium apii) was reported only from New York where it is said to have almost disappeared from the State.

ROOT KNOT (Heterodera marioni) is becoming increasingly severe in the muck soil sections of New Jersey and also occurs in greenhouses. In Michigan there was more than usual. It appears each season in certain fields. The nemas survive the winter in muck soils but apparently in small numbers for the population does not built up fast enough to cause serious damage during average seasons. The maximum incidence in any one field was 50 percent, and loss for the State was a trace. Ohio reported a loss of 1 percent.

VIRUS DISEASES. Mosaic was reported from Connecticut. In New York there is always a trace in many commercial plantings but no loss. G. B. Ramsey reported it as prevalent in shipments of Florida celery received in the Chicago market. Two or more forms occur in the late crops in Michigan. They were more prevalent than usual in some fields but the infection was late and the damage was slight. In Iowa, mosaic was prevalent in the Crystal Lake region.

California reported three types of virus troubles designated as "calico", "western mosaic", and "yellows". As much as 94 percent infection with the western mosaic was observed in a field in Alameda County, and one forty-acre field was so badly damaged in Santa Clara County that it was plowed under. The disease occurred in other parts of the State also. Yellows, caused by the California aster yellows virus, was most generally distributed of these virus diseases. Infection was usually less than 1 percent but one field in Monterey County showed 30 percent.

BLACK HEART (non-parasitic) was reported from Massachusetts and New York, in both cases in less than the usual prevalence.

CRACK STEM (non-parasitic). A serious outbreak was reported from one farm only in Massachusetts. The soil was heavily limed in the fall of 1934. The worst spot tested high in hydrogen ion concentration and was low in potassium and manganese. No test was made for boron. Shipments of Florida celery were reported from the Chicago market as badly blemished by this trouble.

BOLTING (non-parasitic) was unusually prevalent in Michigan. Some early plantings were exposed to freezing temperatures and snow, and in these fields premature seeding was general, exceeding 40 percent of the plants in some cases.

A P I U M   G R A V E O L E N S   R A P A C E U M.   C E L E R I A C

MOSAIC (virus). California reported the Western celery mosaic from Contra Costa County.

ARTICHOKE, GLOBE. See CYNARA SCOLYMUS

ARTICHOKE, JERUSALEM. See HELIANTHUS TUBEROSUS

ASPARAGUS OFFICINALIS. ASPARAGUS

BLIGHT or TIP WILT due to Alternaria sp. and Botrytis cinerea caused 1 percent loss in Massachusetts.

STEM ROT (Fusarium sp.) was reported as more widespread in Massachusetts, where it caused 5 percent loss. In New York, it seemed to be more severe following freezing injury. It was also reported from New Jersey.

RUST (Puccinia asparagi). More than usual was reported from Massachusetts and North Dakota and the usual amount from Wisconsin. In one field of the Mary Washington variety in Clarke County, Georgia, half of the plants were badly infected in September. In Connecticut it was observed once on an escaped plant. Chupp reported that he has seen none in New York for several years. Massachusetts reported 3 percent loss, Maryland, 1.5, Texas and North Dakota each a trace.

STAIN (Rhizoctonia sp. /solani type/). California reported a staining of tips occurring in Sacramento County.

BEAN. See PHASEOLUS VULGARIS

BEAN, LIMA. See PHASEOLUS LUNATUS MACROCARPUS

BEET. See BETA VULGARIS

BETA VULGARIS. BEET, GARDEN

SCAB (Actinomyces scabies). Massachusetts, New Jersey, New York, Wisconsin, and Washington; unimportant, as usual.

LEAF SPOT (Cercospora beticola) was reported from several widely scattered States, but in most cases was not important except locally. In New York the disease was said to be rarely important except near mangels. In New Jersey and Ohio infection of both beets and mangels was so severe in some instances that half the leaf area was destroyed. Losses reported were 5 percent in Iowa, 4 percent in Ohio, and 1 percent in Texas.

DOWNY MILDEW (Peronospora schachtii) appeared on both garden beets and seed beets in California.

ROOT ROT and LEAF SPOT (Phoma betae). New Jersey.

ROOT ROT (Phymatotrichum omnivorum). Texas, caused a loss of 5 percent.

DAMPING-OFF (*Pythium* spp., *Rhizoctonia* sp.). See damping-off, various organisms.

STEM ROT (*Sclerotium rolfsii*). Texas.

DAMPING-OFF (various organisms). Damping-off due to *Rhizoctonia* and *Pythium* was severe in early plantings in Massachusetts, causing 50 to 60 percent loss. *Pythium* sp. was reported from Texas, and *P. debaryanum* from greenhouses in New Jersey. New York and Washington also reported damping-off.

ROOT KNOT (*Heterodera marioni*). Texas.

CURLY TOP (virus) was widespread and much more prevalent than usual in Arizona. In Oregon a loss of 40 percent was estimated.

BETA VULGARIS CICLA. SWISS CHARD

LEAF SPOT (*Cercospora beticola*) was reported from New York, New Jersey, and Texas. It caused a complete loss in two quarter-acre plantings on Long Island.

CURLY TOP (virus). California.

BETA VULGARIS MACRORHIZA. MANGEL-WURZEL

LEAF SPOT (*Cercospora beticola*). Connecticut, New York, New Jersey, and Ohio.

ROOT ROT (*Pythium debaryanum*). New Jersey.

STEM ROT (*Sclerotium rolfsii*). Texas.

BRASSICA CAMPESTRIS. RUTABAGA

BLACK LEAF SPOT (*Alternaria brassicae*). New Jersey.

POWDERY MILDEW (*Erysiphe polygoni*). Connecticut and California.

DOWNY MILDEW (*Peronospora parasitica*). Connecticut and New Jersey.

CLUB ROOT (*Plasmodiophora brassicae*). Connecticut.

SOFT ROT (*Bacillus carotovorus*) caused a total loss in one two-acre field on the Agricultural College farm in Georgia. A considerable amount of blackleg had occurred in the potato crop grown on this field earlier in the year and there were many rotted potatoes in the soil.

NEMATODE (Anguillulina pratensis). Maryland, a new host for this nema.

DARK CENTER (undetermined) caused severe damage to several large plantings in western Massachusetts, with a total loss of 1 percent. This trouble is identical with one attributed to boron deficiency in Maine and Canada.

BRASSICA OLERACEA ACEPHALA. COLLARD

POWDERY MILDEW (Erysiphe polygoni). Connecticut.

CLUBROOT (Plasmodiophora brassicae). New Jersey.

WATERY SOFT ROT (Sclerotinia sclerotiorum). Seen as a soft rot of stems in one field near Athens, Georgia.

BRASSICA OLERACEA BOTRYTIS. BROCCOLI

BLACK LEAF SPOT (Alternaria brassicae). New Jersey, Louisiana, and Texas.

DOWNY MILDEW (Peronospora parasitica). California.

BLACK-LEG (Phoma lingam). New Jersey.

CLUBROOT (Plasmodiophora brassicae). New Jersey.

BLACK ROT (Bacterium campestre). Texas, Wisconsin, and California.

NECROTIC RING MOSAIC (virus). California.

BRASSICA OLERACEA BOTRYTIS. CAULIFLOWER

BLACK LEAF SPOT (Alternaria brassicae). Massachusetts, New York, Louisiana, and Texas.

WIRE STEM (Corticium vagum). New York and New Jersey.

YELLOWS (Fusarium conglutinans). Wisconsin.

DOWNY MILDEW (Peronospora parasitica). New York and California.

BLACK LEG (Phoma lingam). New York.

ROOT ROT (Phytophthora megasperma). California.

CLUBROOT (Plasmodiophora brassicae). Massachusetts, more prevalent; New York, "Almost 80 percent loss in a few fields in Delaware County"; New Jersey; and Washington.

WATERY SOFT ROT (Sclerotinia sclerotiorum). New York.

SOFT ROT (Bacillus carotovorus). New York.

BLACK ROT (Bacterium campestre). Massachusetts, "Prevalent early, 5 percent loss"; New York, "Generally distributed in Delaware County"; New Jersey; Texas, 5.

PEPPERY LEAF SPOT (Bacterium maculicola). Massachusetts, trace; New York, "Because of hot water treatment of seed and other precautions which growers take, this disease has almost disappeared from the State".

MOSAIC (virus). California.

NECROTIC RING MOSAIC (virus). California.

WHIPTAIL (non-parasitic). New York, "Not as serious as in 1934 when 20,000 crates were lost. One field seriously affected."

BRASSICA OLERACEA CAPITATA. CABBAGE

BLACK LEAF SPOT (Alternaria brassicae) was observed in Massachusetts, New York, New Jersey, North Carolina, Louisiana, Texas, Wisconsin, and Iowa. In New York seedlings were most affected. In North Carolina cabbage remaining in the field for some time after maturity was considerably damaged.

WIRE STEM (Corticium vagum). Massachusetts; New York, "Very little in seed beds this year"; New Jersey, severe in some Camden County beds; Pennsylvania; Texas; and Kansas.

POWDERY MILDEW (Erysiphe polygoni). Connecticut and California.

YELLOWS (Fusarium conglutinans) was reported from Massachusetts, scarce; Connecticut, one report; New York, "More, seems to be spreading in western part of State"; New Jersey, "Very severe, caused great losses to some users of susceptible varieties"; Pennsylvania, more; Maryland, less, "Losses decreasing with the increasing use of resistant varieties, reduction in yield 6 percent"; Virginia, usual trace; North Carolina, "Considerable loss in southern counties on light sandy soils"; South Carolina, "Found for the first time in the Charleston section, two severe cases"; Mississippi; Texas; Ohio, "Use of resistant varieties is decreasing prevalence"; Michigan, "Less than last year, not yet general in cabbage sections but each year more

growers report the increasing importance of the disease"; Wisconsin; Iowa, "Less, cool June and use of resistant sorts reduced loss materially"; Missouri, less, 5 percent loss; Kansas; Arizona, "Much more, worse in central Arizona".

RING SPOT (Mycosphaerella brassicicola). California.

DOWNY MILDEW (Peronospora parasitica). New York, "Mostly in seed beds, most abundant on Long Island in fields where the largest quantities of potash are applied"; New Jersey, "Severe in some December-sown seed beds"; South Carolina, "Rather serious in the Charleston area especially in seed beds"; Georgia, "Infection heavy on young plants in south Georgia grown for shipping in May"; Florida, "Less, observed in a few seed beds and in the Everglades"; Mississippi; Louisiana, "In a few cases the loss was severe on young plants"; Texas, 2 percent; Washington, Bellingham area.

SMOTHERING (Peziza vesiculosa). This organism was said to be very prevalent in greenhouses in Camden County New Jersey. In several cases seedlings were practically smothered by this non-parasitic fungus.

BLACK LEG (Phoma lingam). Massachusetts; about the usual amount; New York, "Less, hot water treatment and rotation seem to check spread. One seed grower sold more than 100 pounds of heavily infected seed"; New Jersey, "Numerous samples of seed were sent to the station to be given the hot water treatment"; Pennsylvania, less, trace; Maryland, less, 1.5; South Carolina, "Charleston area, mostly a few individual plants per field"; Wisconsin, "Noted in many seed beds, evidently associated with soil infection"; Iowa, less.

CLUBROOT (Plasmodiophora brassicae) occurred in New Hampshire; Massachusetts, "More damaging than in the average season; appeared to be favored by the generally wet weather in June and early July"; Connecticut; New York; New Jersey; Pennsylvania; Maryland, more, 1 percent; Virginia, "The soil of a home garden where the disease developed in severe form was found to be very acid in reaction"; Ohio, less than in 1934; Wisconsin, more; Washington.

DAMPING OFF (Pythium sp.). New Jersey and Texas.

DAMPING OFF (Rhizoctonia sp.). Texas.

ROT (Rhizoctonia sp.). Bottom rot was reported in less than the usual amount from New York and head rot occurred in the usual prevalence in Wisconsin.

WATERY SOFT ROT (Sclerotinia sclerotiorum). Massachusetts, New York, South Carolina, and Louisiana.

STEM ROT (Sclerotium rolfsii). Texas.

SOFT ROT (Bacillus carotovorus). New Jersey, Mississippi, Texas, North Dakota, and Kansas.

BLACK ROT (Bacterium campestre). Massachusetts, more than usual, 5 percent loss; New York, less; New Jersey, "More common, yields reduced to a considerable extent in some plantings"; Pennsylvania, usual prevalence, 10; Maryland, more, 1; Tennessee, "Usual amount, very few growers treat their seed, 5"; Mississippi; Louisiana, "Scattered infection, also noted on winter crop"; Texas, 8; Ohio, "More common than usual, has reduced yields considerably in some localities"; Wisconsin, more; Minnesota, 1; Iowa, "Usual prevalence locally, 5"; Puerto Rico, "Occurs occasionally when introduced on seed from the north". Black rot was not observed in Kansas.

PEPPERY LEAF SPOT (Bacterium maculicola). Washington. It was not observed in New York this season.

ROOT KNOT (Heterodera marioni). Mississippi and Texas.

MOSAIC (virus). Mississippi and Wisconsin. Necrotic ring mosaic appeared in four counties in California.

OEDEMA (non-parasitic) was observed in New York and New Jersey.

TIP BURN (non-parasitic) caused a trace of injury in New York.

BRASSICA OLERACEA CAULORAPA. KOHLRABI

CLUB ROOT (Plasmodiophora brassicae). New Jersey and New York.

MALNUTRITION (non-parasitic) was observed spreading throughout one field in Burlington County, New Jersey. Yellowing and poor growth were the principal signs.

BRASSICA OLERACEA GEMMIFERA. BRUSSELS SPROUTS

RING SPOT (Mycosphaerella brassicicola). California.

BLACK LEG (Phoma lingam). New Jersey.

BLACK ROT (Bacterium campestre). Texas.

NECROTIC RING MOSAIC (virus). California.

BRASSICA RAPA. TURNIP

SCAB (Actinomyces scabies). Approximately one-fourth of the crop was ruined in one field in Middlesex County, New Jersey.

WHITE RUST (Albugo candida). Texas.

BLACK LEAF SPOT (Alternaria brassicae and Alternaria sp.). Massachusetts, New Jersey, and Texas.

LEAF SPOT (Alternaria herculea). Iowa.

STEM ROT (Corticium vagum). Texas.

LEAF SPOT (Cylindrosporium brassicae). Mississippi, "Severe outbreak in Jones County, 100 percent loss in many fields"; Texas, 5.

POWDERY MILDEW (Erysiphe polygoni). Connecticut.

ROOT ROT (Phymatotrichum omnivorum). Texas.

CLUB ROOT (Plasmodiophora brassicae). Massachusetts, "Two acres observed in early spring with 30 percent loss"; New Jersey.

SOFT ROT (Bacillus carotovorus). Iowa, trace.

BLACK ROT (Bacterium campestre). Texas.

ROOT KNOT (Heterodera marioni). Texas.

MOSAIC (virus). Connecticut.

WEATHER INJURY (drought) caused a 50 percent loss of the early and mid-season crop in Massachusetts.

BROCCOLI. See BRASSICA OLERACEA BOTRYTIS

BRUSSELS SPROUTS. See BRASSICA OLERACEA GEMMIFERA

CABBAGE. See BRASSICA OLERACEA CAPITATA

CAJANUS INDICUS. PIGEON PEA

DIE BACK (undetermined). Puerto Rico.

CANTALOUPE. See CUCUMIS MELO

CAPSICUM ANNUUM. PEPPER

FRUIT SPOT (Alternaria sp.). Massachusetts, prevalent; New York; New Jersey; Texas, 0.5 percent loss; Ohio, "Heavy rains in July and August seemed to favor the disease, plants in many fields defoliated, 5"; Kansas.

LEAF SPOT (*Cercospora capsici*). Florida, Texas, Louisiana, Ohio.

ANTHRACNOSE (*Colletotrichum nigrum*). Louisiana.

WILT (*Fusarium annuum*). Arizona.

WILT (*Fusarium* sp.). Louisiana and Texas.

ANTHRACNOSE (*Glomerella cingulata*). Louisiana and Texas.

FRUIT ROT (*Phoma destructiva*). Mississippi.

LEAF SPOT (*Phyllosticta* sp.). Delaware, "Fruiting on spots and associated with bacterial leaf spot infection."

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

DAMPING OFF (*Pythium debaryanum*). New Jersey.

COLLAR ROT (*Sclerotinia sclerotiorum*). California.

SOUTHERN BLIGHT (*Sclerotium rolfsii*). Louisiana and Texas.

SOFT ROT (*Bacillus carotovorus*). Texas.

BACTERIAL SPOT (*Bacterium vesicatorium*). Massachusetts, "Prevalent, slight injury"; New Jersey, "Becoming a serious problem. Very severe in Cumberland and Atlantic Counties, caused almost complete defoliation in many fields"; Delaware, "Very severe in two commercial plantings with plants from Georgia"; Wisconsin, "One two-acre commercial planting ruined, evidently brought in on seed."

ROOT KNOT (*Heterodera marioni*). New Jersey, "Prevalent in several greenhouses but caused no important loss"; Texas.

CURLY TOP (virus). Oregon and California.

MOSAIC (virus). Massachusetts, "More prevalent than usual, 10 percent"; New York, "Occurred in Richmond County"; New Jersey; Virginia, 10; Texas, 5; Florida, "Very prevalent in the Everglades this season"; Kansas.

RING SPOT (virus ?). New York, "What seems to be a hitherto unreported disease has been found for two consecutive years in Schenectady County. "It resembles ring spot of tobacco except that the rings are much larger and more definite."

SPOTTED WILT (virus). California.

BLOSSOM END ROT (non-parasitic). New York.

FRUIT SPOT (undetermined). Dr. G. P. Clinton reported as follows: "This unusual trouble developed internally before showing on the surface, much as does the Baldwin spot of apples. It was reported once and has not been observed previously. No mycelium was found in the fruit". Drought is suggested as a possible cause. Iowa also reported a fruit spot of unknown origin causing a 6 percent reduction in yield.

FROST INJURY occurred in Connecticut.

SUN SCALD was found in a few fields in New York.

CARROT. See DAUCUS CAROTA

CAULIFLOWER. See BRASSICA OLERACEA BOTRYTIS

CELERIAC. See APIUM GRAVEOLENS RAPACEUM

CELERY. See APIUM GRAVEOLENS

C I C H O R I U M E N D I V I A. E N D I V E

BOTTOM ROT (*Corticium vagum*). Texas.

ANTHRACNOSE (*Marssonina panattoniana*). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

WATERY SOFT ROT (*Sclerotinia sclerotiorum*). Georgia.

STEM ROT (*Sclerotium rolfsii*). Texas.

C I C H O R I U M E N D I V I A. E S C A R O L E

BOTTOM ROT (*Corticium vagum*). Texas.

ANTHRACNOSE (*Marssonina panattoniana*). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

STEM ROT (*Sclerotium rolfsii*). Texas.

C I T R U L L U S V U L G A R I S. W A T E R M E L O N

LEAF BLIGHT (*Alternaria cucumerina* /*Macrosporium cucumerinum*/). Michigan, several plantings observed in the southern part of the State in which almost complete defoliation occurred before any melons had matured.

LEAF SPOT (*Cercospora citrullina*). Texas.

ANTHRACNOSE (Colletotrichum lagenarium). Massachusetts, "Less than usual on both foliage and fruit"; New York; New Jersey, "Very severe in several plantings"; Delaware, "Very severe in late maturing plantings"; Mississippi; Texas; Michigan, "Much more, fruit spotting late in the season was serious enough to ruin the crop in some plantings"; Minnesota, more; Kansas. Losses estimated were 20 percent in Iowa, 7 percent in Maryland, and 5 percent in Massachusetts.

STEM END ROT (Diplodia sp.). Texas.

WILT (Fusarium bulbigenum var. niveum) was reported as having been found for the first time in Delaware. A heavy infection caused from 25 percent to complete loss of the Stone Mountain variety in a field in Sussex County. It was apparently introduced with the seed. A trace was found in a planting of Kleckley Sweet. The disease is said to be relatively new to the Norfolk section of Virginia, but it is spreading rapidly there. The loss was estimated at 4 percent. In Tennessee it caused a 10 percent killing of plants locally. In North Carolina, wilt was severe on many soils formerly used for watermelons. Five to seven years rest seems to give practical reduction in losses in that State. Texas reported 5 percent loss. Less than usual, with a loss of 4 percent was reported from Iowa. New Jersey, Mississippi, Kansas, Wyoming and California also reported its occurrence.

DOWNY MILDEW (Pseudoperonospora cubensis). Connecticut and Wyoming.

DAMPING OFF (Rhizoctonia sp.). Texas.

ROOT KNOT (Heterodera marioni). Texas.

MOSAIC (virus). Texas.

CUCUMIS MELO. CANTALOUPE

LEAF BLIGHT (Alternaria cucumerina). Massachusetts, less than usual, 3 percent loss; New York; New Jersey; Delaware; Maryland, more, 5; Texas; South Carolina; Ohio, more, 10; Michigan, "Much more, caused widespread damage. Defoliation occurred early enough to curtail the crop and seriously affect the quality of much of the late harvest, loss 5 percent"; Wisconsin, more; Iowa, much more, 20 percent loss; California, "In only one seed lot in plots at Davis in September".

LEAF SPOT (Cercospora cucurbitae). Texas.

ANTHRACNOSE (Colletotrichum lagenarium) appeared in Massachusetts, "Less than usual, dry in late July and through August"; New York, less; New Jersey, prevalent; Pennsylvania, more, 2 percent loss; Maryland, 0.5; Michigan, "Considerable spoiling of fruit in late varieties, dry weather from mid-August to October prevented general damage"; Wisconsin, "More, very destructive in central part of State, 25 percent loss"; Iowa, much more, 20; Kansas, "Less than in 1934, much less than in an average year".

POWDERY MILDEW (*Erysiphe cichoracearum*). New Jersey and Texas.

FRUIT ROT (*Diplodia* sp.). Texas.

WILT (*Fusarium bulbigenum* var. *niveum*). New York, "Seems to be spreading in western part of the State, now known in Monroe, Erie, and Niagara Counties"; Mississippi; Texas and Minnesota.

GUMMY STEM BLIGHT (*Mycosphaerella citrullina*). New York.

LEAF SPOT (*Phyllosticta cucurbitacearum*). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

DOWNY MILDEW (*Pseudoperonospora cubensis*). Reported from Connecticut; Delaware, less, trace of infection found, not general; Maryland, 1; Texas, 15; Iowa, 2. Not seen in Wisconsin.

DAMPING OFF (*Pythium debaryanum*). New Jersey.

CHARCOAL ROT (*Rhizoctonia bataticola*). Texas.

FRUIT ROT (*Rhizopus nigricans*). Texas.

STEM ROT (*Sclerotium rolfsii*). Texas; Arkansas, rather common.

LEAF SPOT (*Septoria cucurbitacearum*). New York.

BACTERIAL WILT (*Bacillus tracheiphilus*). Massachusetts, general with usual prevalence, loss 10 percent; Connecticut; New York, less than usual; New Jersey, "One-sixth of the plants in a one-acre field affected"; Maryland, more, 3; Kansas, less.

ANGULAR LEAF SPOT (*Bacterium* sp.). New Jersey.

ROOT KNOT (*Heterodera marioni*). New Jersey, Mississippi, and Texas.

CURLY TOP (virus). Oregon, 10 percent loss; California.

MOSAIC (virus). Connecticut, New Jersey, Maryland, Texas, Wisconsin, Kansas, and California.

C U C U M I S   S A T I V U S.   C U C U M B E R

LEAF BLIGHT (*Alternaria cucumerina*). New York, "Trace, rarely important"; New Jersey, "Common but not serious"; Maryland, "More prevalent than usual, loss 5 percent"; Texas, 0.5; Ohio, "More, considerable loss where not checked by spraying"; Wisconsin, more.

FRUIT ROT (Botrytis sp.). Illinois.

SCAB (Cladosporium cucumerinum). Massachusetts, prevalent as usual, loss 1.5 percent; New York, rather common late in the season, 0.5 to 2; Pennsylvania, more prevalent, 3; Wisconsin, more than in 1934.

ANTHRACNOSE (Colletotrichum lagenarium). Massachusetts; New Jersey; Pennsylvania, more; Maryland, more; Tennessee, "Caused severe injury in plantings at the Cumberland Homestead project"; Mississippi; Wisconsin, more; Puerto Rico, very prevalent.

POWDERY MILDEW (Erysiphe cichoracearum). Massachusetts, New Jersey, Texas, and California.

WILT (Fusarium bulbigenum var. niveum). Texas.

FRUIT ROT (Fusarium sp.). Texas.

GUMMY STEM BLIGHT (Mycosphaerella citrullina). New York, "Spreading in the State"; New Jersey, "Severe but did not affect the yield".

DOWNY MILDEW (Pseudoperonospora cubensis). Massachusetts, "Less, of no commercial importance"; Connecticut; New York; Maryland, "More, 1 percent reduction in yield"; Louisiana, "Requires two sprayings a week to keep under control"; Texas, 5; Wisconsin.

ROOT ROT (Phymatotrichum omnivorum). Texas.

DAMPING OFF (Pythium debaryanum). Connecticut and New Jersey.

TIMBER ROT (Sclerotinia sclerotiorum). New York, trace; Illinois, "Caused serious damage in greenhouse."

STEM ROT (Sclerotium rolfsii). Texas.

SOFT ROT (Bacillus carotovorus). New Jersey.

BACTERIAL WILT (Bacillus tracheiphilus). Massachusetts, 20 percent loss; New York; New Jersey; Pennsylvania, 10; Maryland, more, 1.5; Texas, 1; Ohio, "Much more, extremely large number of beetles resulted in a serious attack this season, 8 percent"; Michigan, "More, beetles very numerous but the general use of poison prevented more serious losses, garden plantings often a total loss, 3"; Wisconsin, more; Iowa, 3.

ANGULAR LEAF SPOT (Bacterium lachrymans). Massachusetts, trace;

New York, trace; Delaware, "Very general following heavy rains during the week of June 24"; Mississippi; Texas, trace; Wisconsin; Iowa, trace.

ROOT KNOT (Heterodera marioni). Massachusetts, New Jersey, and Texas.

CURLY TOP (virus). Washington and Oregon.

MOSAIC (virus). Massachusetts, 2 percent; New Jersey; New York; Maryland, 5; Texas, 1; Ohio, 2; Michigan, 2; Wisconsin; North Dakota, trace; Kansas; Wyoming; California; Puerto Rico, "Very serious last part of the season, the first serious outbreak seen on the island."

MALNUTRITION. Magnesium deficiency was more noticeable in Massachusetts than in the average season.

WEATHER INJURY. Drought was estimated to have caused a 20 percent reduction in yield in Massachusetts.

CUCURBITA MAXIMA. SQUASH

LEAF BLIGHT (Alternaria cucumerina /Macrosporium cucumerinum/). New York.

BROWN ROT (Choanephora cucurbitarum). New Jersey and Texas.

SCAB (Cladosporium cucumerinum) was present in Massachusetts but caused practically no injury on winter squash.

ANTHRACNOSE (Colletotrichum lagenarium). New Jersey.

POWDERY MILDEW (Erysiphe cichoracearum). New York, New Jersey, Texas, and California.

STORAGE ROT (Fusarium sp.). New Hampshire and Massachusetts.

WILT (Fusarium sp.). Texas and California.

GUMMY STEM BLIGHT and FRUIT ROT (Mycosphaerella citrullina). Massachusetts, less severe than in an average year.

STORAGE ROT (Penicillium sp.). Massachusetts.

DOWNY MILDEW (Pseudoperonospora cubensis). Texas.

BLACK MOLD ROT (Rhizopus sp.). Massachusetts.

BACTERIAL WILT (Bacillus tracheiphilus). Massachusetts, "The most

damaging disease in all squash varieties, reduction in yield 9 percent, additional loss due to fruit decay in storage, 1"; New York; New Jersey, "Common throughout the State, severe in some plantings".

LEAF SPOT (Bacterium cucurbitae). Massachusetts, "Very common but of little importance due to dry weather"; New York.

ROOT KNOT (Heterodera marioni). Texas.

CURLY TOP (virus). Washington and Oregon.

MOSAIC (virus). Massachusetts, New York, New Jersey, Texas, and California.

CUCURBITA PEPO. PUMPKIN

LEAF SPOT (Alternaria sp.). New Jersey.

POWDERY MILDEW (Erysiphe cichoracearum). Massachusetts, New York, and New Jersey.

BLACK ROT (Mycosphaerella citrullina). New York, "Caused slight loss on one farm on fruit of pumpkin. Less severe than in 1934."

DOWNY MILDEW (Pseudoperonospora cubensis). New Jersey.

WILT (Bacillus tracheiphilus). New York.

MOSAIC (virus). New Jersey.

CUCURBITA PEPO CONDENSA. SUMMER SQUASH

SCAB (Cladosporium cucumerinum). Massachusetts reported considerable damage in July and early August.

POWDERY MILDEW (Erysiphe cichoracearum). Connecticut.

WILT (Bacillus tracheiphilus). Massachusetts, 9 percent reduction in yield; Connecticut.

CURLY TOP (virus). Oregon.

MOSAIC (virus). Massachusetts, "Much more common and destructive in the eastern part of the State, more damaging to summer than to winter squash."

C U C U R B I T A sp. G O U R D

ANTHRACNOSE (Colletotrichum lagenarium). New Jersey; Delaware, "Ornamental types of some varieties showed heavy fruit infection, colored fruits as variegated types appeared resistant".

DOWNY MILDEW (Pseudoperonospora cubensis). New Jersey.

C Y N A R A S C O L Y M U S. A R T I C H O K E, G L O B E

POWDERY MILDEW (Erysiphe cichoracearum). California.

D A U C U S C A R O T A. C A R R O T

BLACK ROT (Alternaria radicina). New York.

LEAF SPOT (Cercospora apii carotae). Massachusetts, New York, Texas, Ohio, Minnesota, and California.

STEM ROT (Corticium vagum). New Jersey.

SCAB (Fusarium sp. isolated in culture) on the roots was observed for the first time in Arizona. "The high price paid for winter carrots last season increased the acreage and also emphasized diseases. Scab may have been present before but not noticed."

LEAF BLIGHT (Macrosporium carotae). Massachusetts, "Ubiquitous, loss 5 percent"; Connecticut; New Jersey, "Very severe in Middlesex County and prevalent also in Bergen, Hunterdon, and Passaic Counties"; New York, "More than usual due to rainy periods"; Pennsylvania, more, 5; Texas; Ohio; Michigan, "High rainfall as well as temperature responsible for greater prevalence than usual"; Missouri, much more, 20; Arizona, "Much more, serious in 1934 for the first time, on winter carrots in the Salt River Valley and later in the Prescott area."

ROOT ROT (Phymatotrichum omnivorum). Texas.

WATERY SOFT ROT (Sclerotinia sclerotiorum). Massachusetts and New York.

STEM ROT (Sclerotium rolfsii). Texas.

DAMPING OFF (various organisms). Massachusetts.

SOFT ROT (Bacillus carotovorus). Massachusetts, prevalent in storage; New York; New Jersey; Texas; Minnesota, "Growth of carrots checked in mid-summer by high temperature, followed by second growth that attracted

the seed-corn maggot, eggs being deposited in the tender second growth shoots, soft rot followed the injury"; Iowa.

BACTERIAL SPOT (Pseudomonas carotae). Iowa and California.

YELLOWS (virus). Connecticut; New York, "Severe in Nassau County, 80 percent infection in a few fields."

DODDER (Cuscuta sp.). Texas.

ROOT ROT (undetermined). Wyoming reported a 7 percent loss due to an undetermined cause, possibly soil condition.

DILL. See ANETHUM GRAVEOLENS

D I O S C O R E A sp. Y A M

WILT (Fusarium sp.). Puerto Rico.

BLIGHT (undetermined). Puerto Rico, a Colletotrichum was isolated from several lesions.

EGG PLANT. See SOLANUM MELONGENA

ENDIVE. See CICHORIUM ENDIVIA

ESCAROLE. See CICHORIUM ENDIVIA

FENNEL. See FOENICULUM VULGARE

F O E N I C U L U M V U L G A R E. F E N N E L

STEM ROT (Rhizoctonia sp.). New Jersey, caused decayed pits at base of stems a few days after plants were ridged with soil for bleaching.

GARLIC. See ALLIUM SATIVUM

GOURD. See CUCURBITA sp.

GUMBO. See HIBISCUS ESCULENTUS

H E L I A N T H U S T U B E R O S U S. A R T I C H O K E, J E R U S A L E M

POWDERY MILDEW (Erysiphe cichoracearum). Georgia.

RUST (Puccinia helianthi). Massachusetts and Georgia.

STEM ROT (Sclerotium rolfsii). Texas.

HIBISCUS ESCULENTUS. OKRA. GUMBO

WILT (Fusarium vasinfectum). Texas.

ROOT ROT (Phymatotrichum omnivorum). Texas.

RHIZOCTONIA ROOT ROT (Rhizoctonia sp.). Texas.

WILT (Verticillium albo-atrum). New Jersey.

ROOT KNOT (Heterodera marioni). Mississippi and Texas.

HORSERADISH. See RADICULA ARMORACIA

IPOMEA BATATAS. SWEET POTATO

SOIL ROT (Actinomyces sp.). New Jersey, "Apparently increasing in severity in certain sections of southern Jersey"; Delaware; Maryland; Mississippi; Texas; Kansas.

BLACK ROT (Ceratostomella fimbriata). Connecticut; New Jersey, caused some heavy losses; Delaware; Maryland, more than in 1934, 2.5 percent loss; Virginia, 5; Tennessee, "Less than in 1934 or in an average year, 5"; North Carolina, "Not as severe as usual, losses in storage have not been heavy"; Mississippi; Texas, 10; Arkansas, common; Iowa, 5; Indiana, less, 1; Kansas, "Field infection less than in 1934 or in an average year, storage house infection about the same as in previous years."

STEM ROT (Corticium vagum). Texas, Missouri, and Kansas.

DRY ROT (Diaporthe batatatis). Mississippi and Texas.

JAVA BLACK ROT (Diplodia tubericola). Mississippi and Texas.

STEM ROT (Fusarium bulbigenum var. batatas and F. oxysporum f. 2 /F. hyperoxysporum/). New Jersey, "Not serious where sprouts were treated before setting, very severe in some plantings"; Delaware; Maryland, more than usual, 2 percent injury; Virginia, 7; Tennessee, 4; North Carolina, "Worse than it has been in seven years"; Mississippi; Tennessee; Texas; Arkansas, widely distributed; Iowa, less than usual, 4; Indiana, less than usual, much less than in 1934, 3; Kansas, less, 5; California.

SURFACE ROT (Fusarium oxysporum). New Jersey; North Carolina, "Losses in the spring were heavy again this year, by far the most important disease in potatoes remaining in storage after February."

SCURF (Monilochaetes infuscans). Connecticut, New Jersey, Delaware, Maryland, Virginia, North Carolina, Mississippi, Texas, and California. It was not noted in Indiana or Kansas.

ROOT ROT (Phymatotrichum omnivorum). Texas.

FOOT ROT (Plenodomus destruens). Maryland and Tennessee.

MOTTLE NECROSIS (Pythium ultimum). Maryland; North Carolina, "Less severe than usual, sweet potatoes were harvested under more favorable conditions and very little infection occurred even on soils known to be infested."

CHARCOAL ROT (Rhizoctonia bataticola). Maryland, Mississippi, and Texas.

VIOLET ROOT ROT (Rhizoctonia crocorum). Texas.

SOFT ROT, RING ROT (Rhizopus nigricans). New Jersey; Delaware; North Carolina, "Abundant as usual but not as important in storage as some other diseases, caused heavy losses where potatoes were badly bruised and not dried out well in the early period of storage"; Mississippi, "Much more than usual, loss in uncured potatoes from slight to 100 percent"; Texas, 10; Indiana; Iowa, 10; Kansas, 2.

STEM ROT (Sclerotium rolfsii). Texas.

STORAGE ROTS (various organisms). Maryland, 7 percent; Tennessee, 10; Arkansas, "Considerable loss, not as much as in 1934"; Iowa, 15; Puerto Rico.

ROOT KNOT (Heterodera marioni). Mississippi.

MOSAIC (virus). Texas, trace.

KOHLRABI. See BRASSICA OLERACEA CAULORAPA

L A C T U C A   S A T I V A.   L E T T U C E

LEAF SPOT (Alternaria sp.). Texas.

GRAY MOLD ROT (Botrytis cinerea). Massachusetts, "The outstanding disease in the fall crop"; New York, "The most important lettuce trouble this year in Nassau County, more than last year but less than usual in Erie County (up to 10 percent), continues to claim from 10 to 15 percent of the spring crop of Big Boston head lettuce in the Eden Valley district in fields where the crop is grown year after year"; Arizona, "Found for the first time on winter lettuce."

DOWNY MILDEW (Bremia lactucae). Massachusetts, "Not very injurious except in packed boxes watered"; Connecticut, in cold frames; New York, "More severe than for several years, general in cold frames on Romaine and Iceberg"; New Jersey; Arizona, "Reported for the first time, only on winter crop"; California.

BOTTOM ROT (Corticium vagum). Massachusetts, "Unusually conspicuous in the early season"; New York; Texas; Kansas.

ANTHRACNOSE (Marssonina panattoniana). Texas.

ROOT ROT (Phymatotrichum omnivorum). Texas.

DROP (Sclerotinia sclerotiorum). Massachusetts, "More than an average amount in the early crop, from 1 to 80 percent infection in the fields, checked by dry weather and little in the fall crop"; New York, less than usual; New Jersey; Virginia; Florida, 5 percent loss; Texas; Ohio, 1; Arizona, "Much more than in former years, infection which has hitherto been confined to the Elroy district was carried to the Salt River Valley, probably on cull lettuce and trimmings".

LEAF SPOT (Septoria lactucae). Connecticut, New York, and Virginia.

SOFT ROT (Bacillus carotovorus). Massachusetts, prevalent in the fall, loss 2 percent; Texas, 3.

ROOT KNOT (Heterodera marioni). Texas.

BIG VEIN (virus). New York and California.

MOSAIC (virus). New York and New Jersey.

SPOTTED WILT (virus). California, less than formerly.

YELLOWS (virus of aster yellows). New York, New Jersey, Virginia, and Texas. Losses ran as high as 50 percent in some fields in New York. New Jersey reported 19 percent in one field of the Romaine variety, and Virginia, 3, in a ten-acre field.

YELLOWS (California aster yellows). California; Kansas, on wild lettuce.

MALNUTRITION. New Jersey reported an unbalanced condition due to excess nitrogen in the form of ammonia formed during the rapid decay of pea vines in greenhouses. Lettuce was planted in four greenhouses, three were manured with pea vines and one of the three sterilized by steam, the fourth was unsterilized and without pea vines. Plants in the three houses were in a wilted condition, those in the fourth free from wilt.

LYCOPERSICUM ESCULENTUM. TOMATO

COLLAR ROT and EARLY BLIGHT (Alternaria solani). The collar rot phase was very severe in New Jersey, especially on some lots of plants shipped from the South. It caused a total loss in a few fields. Delaware, "Generally reported in Bridgeville area during June, common with some southern shipped plants"; general in Maryland, loss for State 0.5 percent; of minor importance in Georgia.

Early blight in Massachusetts, "Got off to a vigorous start during the rainy weather of June and early July and continued to develop steadily during the dry month of August on many farms. However, it was held under satisfactory control either when several spray applications were made following transplanting, or where the fields were thoroughly treated for late blight during August and September", total loss 8 percent; Connecticut; Pennsylvania, about the usual amount; New York, more prevalent, "All fields had some this year"; Maryland, total loss 8 percent; Virginia, "Appeared in epiphytotic form both in tomato plant beds and in the field. In many cases the plants were completely girdled just above the ground line"; Tennessee, 12 percent loss; South Carolina, more than last year, 15 percent loss. Florida, "Less revalent than usual, due to less dew and fog and an unusually dry season"; Mississippi, "Reported in four counties in southwestern part, of slight importance"; Louisiana, about the usual amount; Texas, 0.1 percent; Ohio, more than usual, "Has caused a large loss of yield on the upper fruit clusters, and in some instances has appeared as a stem-end rot of the fruit and has been very severe"; Michigan, more than usual, "More important in Berrien County than elsewhere this year. Typical nail head spotting of the fruit observed for the first time"; Wisconsin, much more, 15 percent loss, "Found on stems of plants shipped in, mostly from Georgia"; Minnesota, trace; Iowa, "In tomato fields around Marshalltown. Thought to have come in on imported plants. Locally grown plants free"; California, "Found in plant beds at Coyote and Sacramento."

NAILHEAD SPOT (Alternaria tomato). Tennessee, 1 percent loss; Iowa and Oregon, 2 percent loss.

STEM ROT and FRUIT ROT (Botrytis cinerea). In Massachusetts, four or five cases of stem rot were reported. In one case all 4,000 plants had to be removed even before one picking. In Hunterdon County, New Jersey, a severe outbreak was reported on tomato seedlings. The seedlings, in all cases, were severely cankered and nearly completely decayed at the ground line. Georgia, "Young seedlings in Athens greenhouse damped-off badly in May". Illinois, "Because of the damp weather which prevailed during the spring months, a very serious outbreak of stem-end rot occurred in greenhouse plantings." Gray mold fruit rot was reported from New York also.

LEAF MOLD (Cladosporium fulvum). Massachusetts, "Bad this fall"; Connecticut, one report, less than last year; New York, "Less than usual in greenhouses because cooler weather in early fall and late spring gave lower inside humidities"; Pennsylvania, about the same as last year, reported from seven counties, scattered, 2 percent loss; Mississippi, reported from Oktibbeha, Lauderdale, and Harrison Counties; Texas, loss 1 percent; Michigan, "Observed for the first time on field tomatoes. Several fields in Jackson County were heavily infected. These plants were grown in greenhouses and transplanted to the field. Infection originated in the greenhouse but the high humidity of June and July provided very favorable conditions for the continued development and spread of the disease"; Wisconsin, "About the same as last year, mostly a greenhouse trouble"; California, "Serious only in greenhouses."

ANTHRACNOSE (Colletotrichum phomoides). New York, "Present in a few fields"; Maryland, "This disease has been much more important the last three seasons than usual, due to early defoliation because of storms"; Texas, trace; Kansas.

DAMPING-OFF, STEM, and SOIL ROT (Corticium vagum [Rhizoctonia solani]). Damping-off and fruit rot were reported from Connecticut; stem rot from Monmouth County, New Jersey; soil rot caused 0.1 percent loss in Texas.

FUSARIUM WILT (Fusarium lycopersici) was observed in and reported from several sections in Massachusetts and was no doubt more damaging than in the average year. "This disease was conspicuous during the hot dry weather of late July and during August. Twenty-five percent loss of plants on one farm in Hampden County was traced to seed origin";New York; New Jersey, common throughout the State, prevalent in Gloucester, Monmouth, Mercer, and Middlesex Counties; Delaware, scattered infection found; Maryland, scattered, about the same as last year, 0.5 percent loss; Virginia, local, losses reduced by use of Marglobe variety, 7 percent loss, (P. D. R. 19:203, 244); Tennessee, prevalence same as last year, 10 percent loss; North Carolina, "Wilt observed throughout the southeastern and southern part of the State. The resistant varieties give satisfactory control"; South Carolina, same as last year, 5 percent loss; Florida, "Much more prevalent than last year. Usually present in most fields during all seasons but more damage occurred this season due to planting susceptible varieties, combined with dry and hot weather"; Mississippi, general, but less prevalent than last year; Louisiana, reported from five counties in southeastern part of State, about the same as last year; Texas, 3 percent loss; Arkansas, prevalent and fairly important; Indiana, less than last year, but more prevalent compared with average year; Michigan, less than last year, "In an inspection of 1,000 acres in Monroe, Jackson, and Lenawee Counties not a single wilted plant was observed. It is established to some extent in Berrien County and other areas in southwestern Michigan where southern grown plants have been used for several years. Continues as an important disease in the greenhouse"; "A greenhouse trouble in Wisconsin"; Missouri, less than last year, 4 percent loss; Kansas, "No crop due to hot weather, thus no loss from this

disease"; Montana, trace; California, reported from Solano, Contra Costa, Merced, Los Angeles, and San Diego counties.

RIPE ROT (Phoma destructiva). New York; Florida, less than usual, "Occasional heavy losses are suffered by growers and shippers from this disease in the south Dade County area. Shipments in midseason oftentimes run as high as 50 to 60 percent loss from the disease. Western Collier County on the Tamiami Trail is the heaviest loser from this disease. Blowing sand abrades and wounds the fruit, causing nearly 100 percent loss from field infestations and development in shipment"; Texas, 0.1 percent loss.

LATE BLIGHT (Phytophthora infestans). Massachusetts, "Tomato late blight was even less conspicuous than in 1934. Although it made its initial appearance much earlier than in past years, by July 25 in Bristol County, for example, dry weather held it in almost complete control until rains in late August and early September. Heavy losses occurred in a small number of scattered fields of late tomatoes in Norfolk, Plymouth, and Bristol counties, that received inadequate protection. In the rest of the State it was of slight consequence, not showing up until around the last part of September or early October, after even most of the late fields had been harvested. (P. D. R. 19:241, 310); Connecticut, later in appearing and much less than last year, only three reports. New York, "Especially serious in lower Hudson Valley again this year, none found in Nassau or Richmond counties this year"; Pennsylvania and Texas, trace; California, "More prevalent than last year, found in plant beds in Orange County, March 29, also reported from Ventura County."

BUCKEYE, STEM, and WATERY ROT (Phytophthora spp.). Phytophthora parasitica (P. terrestris) was reported from New York. "Present to slight extent, as usual in several greenhouses in Monroe County, affects only the two lower clusters of fruit." Maryland, trace; Texas, 1 percent loss; Illinois, "Outbreak of the disease probably correlated with poor watering practices during the damp cloudy spring." Phytophthora sp. was isolated from tomato in New Jersey, in many cases it caused fruit decay.

TIMBER ROT (Sclerotinia sclerotiorum). New York; Illinois reported serious damage in greenhouse crops. (P. D. R. 19:141).

SOUTHERN WILT (Sclerotium rolfsii). Virginia, trace, (P. D. R. 19: 244); Georgia, "Found destroying young plants in Tifton area"; Texas, 0.1 percent loss; Mississippi; Indiana, trace.

LEAF SPOT (Septoria lycopersici) "Was not destructive in Massachusetts this year. Very dry in August when it usually gets started. Rather heavy infections were observed occasionally late in the season"; Connecticut, four reports, about as prevalent as last year; New York, "More prevalent than last year, caused heavy defoliation in all fields late in year"; New Jersey, prevalent; Pennsylvania, less than last year, scattered, 4 percent

loss; Delaware, general, much more prevalent than last year, "Heavy rains first week of September favored exceptional spread, causing maximum defoliation"; Maryland, scattered and less prevalent than last year, 0.5 percent loss; Tennessee, 8 percent loss, about the same as last year; South Carolina, same as last year, trace; Texas, 1 percent loss; Mississippi; Arkansas, appeared earlier than usual; Ohio, general, more prevalent than last year; Indiana, local, more prevalent than last year; Illinois, (P. D. R. 19:153); Michigan, scattered, more than last year, "Abundant moisture during early part of growing season was very favorable for leaf spot, but a threatening epiphytotic was averted by a dry August and September. Serious defoliation was observed as early as August 15, but drought conditions thereafter almost completely checked further development"; Wisconsin, scattered, less than average year, but as much as last year; Minnesota; Iowa, Missouri, trace; Kansas, no loss reported.

WILT (Verticillium spp.) was observed in and reported from several sections in Massachusetts and was no doubt more damaging than in the average year. It was most conspicuous during the hot dry weather of late July and during August. Also in New York and Washington, reported as V. albo-atrum; Mississippi, reported as V. dahliae.

BACTERIAL CANKER (Aplanobacter michiganense). Massachusetts; New York, found in two greenhouses in Monroe and Erie counties with 10 to 40 percent loss; New Jersey, "A careful inspection of several tomato fields in which the plants were slowly dying showed that the trouble in most cases was caused by this disease, which has been in the State for at least seven years, and in 1930, 1931, and 1932 caused heavy losses on a few farms. In 1933 and 1934 there was very little but the disease was prevalent again this year. A number of infected fields were examined in Monmouth and Gloucester counties, and reports were received to the effect that the disease was prevalent in other localities. One field in Gloucester County showed 100 percent infection"; Pennsylvania, 2 percent loss, more than last year, found in twelve counties; Maryland, 0.5 percent loss, about the same as last year; in Virginia the disease appeared to be seed-borne, since most severely infected fields were grown from seed from one company, loss 5 percent. (P. D. R. 19:203, 243, 244). Reported in most of the southeastern counties of North Carolina, and observed near Johns in Scotland County. In Georgia, the disease was found in one field near Tifton. Reported from three counties in southern Mississippi, less than average year. In east Texas there was considerable damage but the outbreak was sporadic and in the same section the disease was prevalent on one farm and absent from adjoining ones. Probably this may be accounted for by the seed from infected plants. The total loss was estimated to be 5 percent. An inspection of 1,000 acres in southern Michigan revealed an important increase in the amount of canker in recent years. The source was traced to the seed in all instances. The systemic and fruit spot phase of canker seldom occurred in the same field. Kansas, none noted; Wisconsin, same as last year; California, reported from thirteen counties.

BACTERIAL SPECK (Bacterium punctatum). Minnesota, trace.

BACTERIAL WILT (Bacterium solanacearum) was very common throughout New Jersey. In Camden County plants in which injury occurred were from a different shipment than the major portion of the field in which no injury was found; Virginia; severe in Granville, Wake, Durham, and Chatham Counties, North Carolina, also found in various counties in the eastern part of the State. No variety appears resistant; South Carolina, 2 percent loss; Georgia, in fields near Tifton; Mississippi; Texas, 3 percent loss; Illinois, (P. D. R. 19:226).

BACTERIAL SPOT (Bacterium vesicatorium). Maryland and Virginia, less than last year, caused a loss of 0.3 percent in Maryland and 16 percent in Virginia. Georgia, "Some found in almost all fields inspected"; Florida, "Much less than last year, this disease usually follows injury by blowing sand, or insect punctures, no late winds caused sand injury this year"; Mississippi; Texas, 0.5 percent loss; Michigan, more than last year, "Seldom seen in Michigan and the cases observed this season could all be attributed to the use of contaminated seed"; Iowa, more than last year; Missouri, trace. (P. D. R. 19:203, 243, 244, 279).

ROOT KNOT (Heterodera marioni). Massachusetts; Georgia, "In September, a 75 percent infection was noted on mature plants in a two-acre field near Athens"; Florida, same as last year, "Severe during warm months in a few infested areas in the Everglades"; Texas, total loss 1 percent; Wisconsin, in greenhouses; Missouri, trace, less than last year.

CURLY TOP (WESTERN YELLOW BLIGHT) (virus). See also P. D. R. 20: 72-76. Oregon, 40 percent loss; California, "W. C. Cook reports 50 percent curly top in tomatoes in all areas south of Tuolumne River and 20 to 25 percent north of this line (Modesto). Tomatoes are grown mostly north of Modesto on account of this disease"; Arizona, "Occurred wherever tomatoes were grown. One large field interplanted with corn, at San Simon, Cochise County, entirely escaped curly top"; Utah, (P. D. R. 19:191); Montana, 2 percent loss; Washington.

MOSAIC (virus) Massachusetts, general, 2 percent loss, about the same as last year; Connecticut, one report; New York, "Some observed in practically all plantings. Loss probably very slight; New Jersey; Maryland, general, about as prevalent as last year, 0.5 percent loss; Pennsylvania, about the same as last year, scattered, 3 percent loss; Tennessee (P. D.R. 19:153); North Carolina, "Abundant throughout the State"; Florida, less than last year; Mississippi, reported from Jones, Lincoln, Copiah, Hinds, Madison, and Oktibbeha counties. "The practice of staking and pruning tomatoes in the commercial area about Crystal Springs tended to spread the trouble rapidly"; Louisiana; Texas; Illinois, (P. D. R. 19:141); Michigan, "Serious in some fields in Jackson County where it was general in 1934.

Much less important than last year. No aphid infestations observed. In the cases observed the plants had become infected during handling in the greenhouse"; Wisconsin, about the same as last year, local, "Noted in greenhouses in Milwaukee"; Missouri, trace, less than last year; Kansas, "Large percentage of plants affected--affected plants sterile. If the season had been favorable for the crop, loss from fern-leaf mosaic would have been large"; California, same as last year, "State-wide with crop."

SPOTTED WILT (virus) of tomato was recognized for the first time in New York this summer, (P. D. R. 19:244). In Texas it caused 2 percent loss. In Michigan, "It appeared in the College fall and winter crop of tomatoes. All diseased plants were removed as fast as they appeared and the outbreak was checked. This disease apparently was present last season also but was not recognized as spotted wilt." In California it occurred locally in twenty counties. "One case was observed in a greenhouse. It was extremely serious in the Bay region, Santa Clara Valley, Contra Costa, and San Benito counties, Salinas and Santa Maria Valleys, Ventura, Los Angeles, and Orange counties."

STREAK (virus) was about as prevalent in Wisconsin as usual. It is scattered throughout the State.

BLOSSOM END ROT (non-parasitic). Massachusetts, "In late July and August there was a deficiency in soil moisture, loss estimated at 3 percent"; Connecticut; New York, less than last year, "Excessive rainfall in most sections resulted in less disease. Not found on Long Island this year. No susceptible varieties grown"; New Jersey, "Prevalent in several fields in Essex and Middlesex counties"; Maryland, scattered, more than last year, 0.2 percent loss; Tennessee, 5 percent loss; North Carolina, "Was worse than usual. Some reports gave more than 50 percent loss. The losses were worse during the extended drought of June"; South Carolina, general, loss about the same as last year, 5 percent; Florida, "Much more prevalent than last year, locally distributed, maximum amount in any one field 95 percent. Injury perhaps due to methods of irrigation, maintaining saturated condition of soil by ditch seepage method"; Mississippi, general, more prevalent than last year; Ohio, less than last year, "Plentiful rains held this disease at a minimum"; Wisconsin and Iowa, less than last year; Minnesota, 4 percent loss; North Dakota, about as prevalent as last year, 1 percent loss; Montana, trace; Washington, reported from Skagit, Clallam, Jefferson, Kitsap, and Clark counties; Oregon, 8 percent loss.

MANGEL-WURZEL. See BETA VULGARIS MACRORHIZA

MUSK MELON. See CUCUMIS MELO

OKRA. See HIBISCUS ESCULENTUS

ONION. See ALLIUM CEPA

PARSLEY. See PETROSELINUM HORTENSE

PARSNIP. See PASTINACA SATIVA

P A S T I N A C A S A T I V A. P A R S N I P

LEAF SPOT (Cercospora apii pastinacae). Connecticut; and New York, "Prevalent in one small field where parsnips had been grown in 1934 but absent where the same seed was sown on new land."

LEAF SPOT (Ramularia pastinacae). Massachusetts and New York.

WATERY SOFT ROT (Sclerotinia sclerotiorum). California.

DAMPING OFF (various fungi). Massachusetts.

SOFT ROT (Bacillus carotovorus). New Jersey.

ROOT KNOT (Heterodera marioni). New Jersey.

PEA. See PISUM SATIVUM

PEANUT. See ARACHIS HYPOGEA under Diseases of Special Crops.

PEPPER. See CAPSICUM ANNUM

P E T R O S E L I N U M H O R T E N S E. P A R S L E Y

LEAF SPOT (Alternaria sp.). New Jersey.

LEAF BLIGHT (Macrosporium sp.). New Jersey.

DODDER (Cuscuta sp.). Texas.

P H A S E O L U S L U N A T U S M A C R O C A R P U S. L I M A B E A N

ANTHRACNOSE (Colletotrichum lindemuthianum). Mississippi.

ANTHRACNOSE (Colletotrichum truncatum). Mississippi.

STEM ROT (Corticium vagum). Maryland, Florida, California, and Puerto Rico.

POD BLIGHT (Diaporthe phaseolorum). New Jersey and Maryland.

DOWNY MILDEW (Phytophthora phaseoli). New York, New Jersey, Pennsylvania, Maryland, and Ohio, where it was more prevalent than usual.

BACTERIAL BLIGHT (Bacterium phaseoli). Virginia and Georgia.

LEAF SPOT (Bacterium vignae). New York, "Serious in a few fields"; New Jersey, severe; Maryland, "Usual amount, less than in 1934"; Florida, "Occurs in all fields in the Everglades and is thought to be one cause of shedding."

ROOT KNOT (Heterodera marioni). Texas.

MALNUTRITION due to magnesium hunger was reported from Massachusetts and calcium deficiency was the cause of the loss of one ten-acre field in New Jersey.

PHASEOLUS VULGARIS. BEAN

LEAF SPOT (Alternaria fasciculata). New Jersey, severe on the late crop; New York, less than usual.

GRAY MOLD ROT (Botrytis cinerea). New York, less prevalent than in 1934 or in the average season.

LEAF SPOT (Cercospora canescens). Texas.

LEAF BLOTCH (Cercospora cruenta). Texas.

ANTHRACNOSE (Colletotrichum lindemuthianum) was reported as follows: Massachusetts, trace; New York, "Since most seed is Idaho-grown anthracnose is no longer much of a problem"; New Jersey, common; Delaware, more than usual; Maryland, scattered distribution, trace; South Carolina, none reported; Mississippi, scattered; Texas, trace; Ohio, less, generally distributed, 0.5 percent loss; Michigan, "Trace, in garden sorts, not seen in field beans"; Wisconsin, less than usual, too dry; Minnesota, more, loss a trace; Iowa, more, 3; Kansas; North Dakota, trace; Puerto Rico, occasional.

STEM ROT (Corticium vagum). New York, "Found on several farms with resultant 10 percent reduction in yield"; New Jersey; West Virginia, "Pole beans not affected"; Florida, "Also caused soil rot of pods"; Louisiana, less than usual; Texas; Michigan, more, 0.5; California.

SCAB (Elsinoe phaseoli). Puerto Rico.

POWDERY MILDEW (Erysiphe polygoni). Virginia, "Much more prevalent than usual in the Norfolk area, all the losses occurred in the fall crop which is about half the annual output, reduction in yield 15 percent, additional loss in market 25"; Florida; Texas, 3; California.

DRY ROOT ROT (Fusarium solani martii f. 3 /F. martii phaseoli/ and Fusarium spp.). New Hampshire; Massachusetts, 10 percent loss; Connecticut;

Maryland, more than usual, 3; Virginia, more; South Carolina more than usual, 5 percent loss; Mississippi; Ohio, more, 1; Michigan, trace; Montana, 1; Wyoming, 5; California.

ANGULAR LEAF SPOT (Isariopsis griseola). New York, collected once in western part of the State.

ROOT ROT (Phymatotrichum omnivorum). Texas.

DOWNY MILDEW (Phytophthora phaseoli). New Jersey.

DAMPING OFF (Pythium sp.). Texas, 2 percent loss.

ROOT ROT (Rhizoctonia bataticola). Louisiana, the first report of this disease in the State.

STEM ROT (Sclerotinia sclerotiorum). Massachusetts, much less than usual, a trace of pod rot; New York, less, trace.

STEM ROT (Sclerotium rolfsii). Mississippi; Louisiana, "Scattered distribution, a loss as high as 15 percent noted in one place"; Texas, 3; Puerto Rico, "Very abundant during the rainy season."

RUST (Uromyces phaseoli typica). Massachusetts, "Decidedly less conspicuous than in the average season"; New York, "One case seen in a home garden"; Tennessee; Florida, "Infection confined to foliage of mature plants"; South Carolina, trace; Mississippi; Louisiana; Texas; Montana; Washington; California. It was not observed in Wisconsin or Minnesota.

BACTERIAL WILT (Bacterium flaccumfaciens). New York, less than usual; Michigan, "Some fields showed as much as 10 percent dead plants in August on early planted stock, less severe in late plantings"; Nebraska, a survey of 28 fields revealed infection in four averaging 0.5 percent.

BACTERIAL BLIGHT (Bacterium phaseoli and B. medicaginis phaseolicola [halo blight]) occurred as follows:

B. phaseoli: Massachusetts, "Common in spots"; New York, "Serious in a few kidney bean fields planted with eastern seed"; New Jersey, "More severe than for the past few years"; Georgia; Mississippi; Louisiana, more prevalent than halo blight; Texas, 5 percent loss; South Carolina, "Bacterium spp. more because of heavy rains and low temperature early in the season, total loss a trace"; Ohio, "Chiefly B. phaseoli, has caused losses running as high as 70 percent in some varieties"; Michigan, "Less than in 1934, systemic infection general this season, 2.5"; Wisconsin, North Dakota, more, 0.5; Nebraska, "Both leaf and pod infection slight"; Kansas, more; Wyoming, 1.5; Arizona, "More loss in central Arizona than in southern part." Puerto Rico.

Halo blight: Massachusetts, 3; Louisiana, less than usual; Ohio; Michigan, "Defoliation noted in many fields when pods were half mature, much worse on early planted stock"; North Dakota; Nebraska, no infection; Wyoming, 5. Undesignated species: Maryland, 1.5; Virginia, more than in 1934, loss on green snap beans, 7; Tennessee, 1; Florida, "Usual amount but less than last year in the Everglades"; Minnesota, 3; Iowa, less, trace; Montana, "Especially bad on garden beans, 2."

ROOT KNOT (Heterodera marioni). Florida, "Severe during the warmer months in a few infested areas"; Mississippi; Texas.

CURLY TOP (virus). Idaho, Washington, Oregon.

MOSAIC (virus). Massachusetts, 3 percent injury; Connecticut; New York, "Rarely a problem any more on field beans, considerable on snap beans especially in fields planted with western seed"; Maryland, "Less, resistant varieties are generally used"; Virginia, prevalent; Tennessee, 2; South Carolina, "Trace; Bountiful and Black Valentine very resistant; all Refugees except the new U. S. strains susceptible"; Florida, "First observation in the Everglades, due to sweet clover virus"; Texas; Michigan, "Robust variety highly resistant, not a factor except in canning stock, trace of injury"; Wisconsin; Minnesota, 2; North Dakota, 2; Nebraska, "A survey of 28 irrigated fields of the Great Northern variety showed all to be infected with an average prevalence of 1 percent; Kansas; Montana, 5; Wyoming, 6; Washington; Oregon, 5; California, Puerto Rico, "Common and very often abundant."

CHLOROSIS (non-parasitic). New Jersey and Texas.

MALNUTRITION due to deficiencies of manganese and zinc occurred with less prevalence in Florida. Manganese deficiency is becoming less common due to the general use of manganese sulfate sprays and zinc deficiency has been controlled by zinc sulfate sprays.

WEATHER INJURY. Drought caused serious reduction in yield in Arkansas and leaf laceration and dwarfing of plants resulted from frost injury in Washington.

PIGEON PEA. See CAJANUS INDICUS

PISUM SATIVUM. PEA

ROOT ROT (Aphanomyces euteiches). Massachusetts, "Partly responsible for root rot losses of 25 percent"; New York, "Present on several farms, loss on two, 5"; New Jersey; Pennsylvania, "Has almost driven pea growers in the southeastern part of the State out of production"; Maryland, less than usual, 3; South Carolina, together with Fusarium caused 10 percent loss; Wisconsin, "Can be found in most pea fields on old pea soils, not as serious as in many previous years"; Montana.

LEAF and POD SPOT (Ascochyta pisi). New Jersey, South Carolina, Michigan, Mississippi, Washington, and California. See also Mycosphaerella.

FOOT ROT (Ascochyta pinodella). South Carolina, Washington, and California. See also Mycosphaerella.

BLIGHT (Ascochyta spp.). Massachusetts, New York, Maryland, Tennessee, Montana, and Oregon. See also Mycosphaerella.

CLADOSPORIUM SPOT (Cladosporium pisicola). Washington and California.

ANTHRACNOSE (Colletotrichum pisi). Wisconsin.

STEM ROT (Corticium vagum). Massachusetts, New York, New Jersey, Texas, Washington.

POWDERY MILDEW (Erysiphe polygoni). Massachusetts; New York; New Jersey; Florida, more than usual; Mississippi; Louisiana; Texas; Wisconsin; Wyoming; Washington; California.

FUSARIUM WILT (Fusarium orthoceras var. pisi). Massachusetts, 2 percent loss; Maryland, "Less than formerly, resistant strains used throughout the infested area"; New York; Texas; Wisconsin, "Use of resistant strains increasing, especially Resistant Wisconsin Perfection"; Montana, trace; Wyoming; Idaho, less than in 1934 due probably to the general use of resistant strains; Washington; Oregon, 2; California.

NEAR WILT (Fusarium oxysporum f. 8). Wisconsin, Idaho, California.

ROOT ROT (Fusarium solani var. martii f. 2 /F. martii pisi7). Massachusetts, South Carolina, Mississippi, Ohio, Wisconsin, Idaho, California.

ROOT ROT (Fusarium sp.). Texas, Ohio, Michigan, Montana, and Washington.

MYCOSPHAERELLA BLIGHT (Mycosphaerella pinodes). Massachusetts; New York; Maryland, "Usual amount, more than in 1934, 0.5 percent loss"; South Carolina, Ascochyta spp. and Mycosphaerella caused 5 percent loss; Texas, 0.5; Wisconsin; California. See also Ascochyta.

DOWNY MILDEW (Peronospora viciae). New York, Mississippi, Wisconsin, Washington, and California.

ROOT ROT (Phymatotrichum omnivorum). Texas.

ROOT ROT (Pythium spp.). Massachusetts, "Caused damping off of seedlings as well as root rot in maturer plants"; Washington.

STEM ROT (*Sclerotinia sclerotiorum*). California.

LEAF SPOT (*Septoria pisi*). Wisconsin and California.

RUST (*Uromyces fabae*). Maine, "Observed for the first time in the State in 1934"; California, first report.

BACTERIAL BLIGHT (*Bacterium pisi*). Massachusetts; New York; Maryland, 0.2 percent; Mississippi, locally severe; Michigan, trace; Wisconsin, more than usual; Montana, 1 percent; Wyoming; California, slight occurrence. An unidentified bacterial blight occurred in Washington.

ROOT KNOT (*Heterodera marioni*). Florida and Texas.

MOSAIC (virus). New York; New Jersey, less than usual; Texas; Idaho, "Three types noted, the most important one caused by the same virus that is common on red clover, another type is identical with yellow bean mosaic (bean virus 2) and a third produces leaf and stipule enations, neither of the two last mentioned types are regarded as commercially important in the State at present"; Washington, two types designated "mosaic" and"W-mosaic"; California, perhaps more than one type.

STREAK (virus). Washington and California.

CHLOROSIS (non-parasitic). Texas and Washington.

WEATHER INJURY. Drought did serious damage in Massachusetts, estimated at 65 percent in most home gardens. It was also reported from Washington. Scorch due to high temperatures did some damage in Wisconsin, and early spring and late fall frosts in the coastal counties of California did considerable injury either by destroying the blossoms or the plants themselves. Blemishes in the form of whitish blisters on the pods and in some cases on the ovules developed as another consequence of frosts.

POTATO. See SOLANUM TUBEROSUM

PUMPKIN. See CUCURBITA PEPO

RADICULA ARMORACIA. HORSERADISH

WHITE RUST (*Albugo candida*). New Jersey, New York, and Ohio.

LEAF SPOT (*Cercospora armoraciae*). Minnesota.

STEM ROT (*Corticium vagum*). Minnesota.

LEAF SPOT (*Macrosporium* sp.). New Jersey.

LEAF SPOT (*Ramularia armoraciae*). New York, severe on two farms.

LEAF SPOT (undetermined). New Jersey.

ROOT ROT (undetermined). New Jersey.

RADISH. See RAPHANUS SATIVUS

R A P H A N U S S A T I V U S. R A D I S H

SCAB (Actinomyces scabies). Wisconsin.

WHITE RUST (Albugo candida). New York, New Jersey, Wisconsin, Iowa.

LEAF SPOT (Alternaria brassicae). New Jersey.

BLACK ROOT (Aphanomyces raphani). Connecticut and Iowa.

POWDERY MILDEW (Erysiphe polygoni). California.

DOWNY MILDEW (Peronospora parasitica). New York, Missouri.

CLUB ROOT (Plasmodiophora brassicae). Massachusetts, very little, much less than usual; New York.

BLACK ROOT (Pythium aphanidermatum). Wisconsin.

DAMPING OFF (Pythium sp.). Massachusetts.

DAMPING OFF (Rhizoctonia sp.). Massachusetts.

ROOT ROT (Rhizoctonia sp.). New Jersey.

R H E U M R H A P O N T I C U M. R H U B A R B

LEAF SPOT (Ascochyta rhei). Connecticut.

ANTHRACNOSE (Colletotrichum erumpens). Pennsylvania.

LEAF SPOT (Phyllosticta straminella). New York.

ROOT ROT (Phymatotrichum omnivorum). Texas.

CROWN ROT (Phytophthora cactorum). Pennsylvania.

ROOT ROT (Phytophthora parasitica). Missouri.

ROOT ROT (Phytophthora sp.). New Jersey; Arkansas, "The limiting factor in rhubarb culture."

RUST (Puccinia phragmitis). California.

CROWN ROT (Rhizoctonia sp.). Texas, 5 percent.

MOSAIC (virus). Illinois, suspected cases; Washington.

DROUGHT. Kansas, "Practically all rhubarb died between July 1934 and the spring of 1935 due to drought."

RHUBARB. See RHEUM RHAPONTICUM

RUTABAGA. See BRASSICA CAMPESTRIS

SALSIFY. See TRAGOPOGON PORRIFOLIUS

SOLANUM MELONGENA. EGGPLANT

LEAF SPOT (Alternaria solani). Massachusetts, more than usual; New York; New Jersey.

STEM ROT (Corticium vagum). New Jersey and Texas.

LEAF SPOT and FRUIT ROT (Phomopsis vexans). Massachusetts, prevalent; Connecticut; New York; New Jersey; Florida; Mississippi; Texas; Iowa, 10 percent loss; Michigan, "Much more than in 1934. No variety of a dozen or more in a commercial planting appeared to be resistant. The disease was general, causing a severe blighting on leaves and fruit."

STEM ROT (Sclerotium rolfsii). Texas.

WILT (Verticillium albo-atrum). Massachusetts, a trace to 10 percent loss; New York, "Still the most serious disease of this crop"; New Jersey.

ROOT KNOT (Heterodera marioni). Texas.

MOSAIC (virus). Massachusetts, "Dwarfs plants and reduces fruitfulness, loss 5 percent"; Texas, 1.

SOLANUM TUBEROSUM. POTATO

SCAB (Actinomyces scabies) was reported as follows: Maine, 4 percent loss; Massachusetts, "Less noticeable than usual, due apparently to high soil moisture at the time tubers were setting, 1"; New York, "More in Monroe County but less in the State as a whole than in 1934, 3"; New Jersey, "More scab than for several years because of dry weather during critical period of infection"; Maryland, more, 4; Tennessee, 0.5; North Carolina, "Very little on late crop in mountain counties, heavy loss on alkaline soils in eastern part of State on the early crop"; South Carolina, trace;Florida, less than usual, 0.1; Mississippi; Texas, 5; Arkansas, not noted; Ohio, less,

0.5; Michigan, "Less, wet and relatively cool weather, 1.5"; Wisconsin, "Usual amount, acid corrosive sublimate five-minute dip gave best control on new soil. Treatment not satisfactory on old potato soil"; Minnesota, less, more moist conditions, 1; Iowa, 5; North Dakota, less, trace, scattered; South Dakota, 2; Kansas, "Soil wet at time of tuber setting in the spring, practically no scab. Soil for fall crop dry, heavy scab infection in some fields"; Montana, 2; Wyoming, 2; Oregon, 4; Washington.

EARLY BLIGHT (Alternaria solani). New Hampshire; Massachusetts, "Heavy June rains favored development, 3 percent loss"; Connecticut; New York, "Common, 5 to 10 percent infection as a maximum in any given field"; New Jersey, of very minor importance; Maryland, more than average amount, loss 1 percent; Virginia, 1; West Virginia, more; Tennessee, general, less than in 1934, 5; North Carolina, "Prevalent but caused but little damage"; South Carolina, trace; Georgia, "Appeared late but destroyed all leaves in several fields in the vicinity of Athens"; Florida, "Much less, very dry. Trace only on the early crop, occurs chiefly on the late spring crop"; Louisiana; Texas, 1; Ohio, 2; Michigan, "General vine infection with some tuber damage, 0.3"; Wisconsin, "More locally, very bad on poorly sprayed Cobblers and other early varieties in central section"; Minnesota, "More, frequent rains and high humidity"; Iowa, trace; North Dakota, trace; Montana, trace; Wyoming, more, trace.

ANTHRACNOSE (Colletotrichum atramentarium). New York, "Mostly following silver scurf, trace scatteringly distributed."

SCURF and STEM ROT (Corticium vagum). Maine, 8 percent injury; Vermont, "Remains fairly constant, reduces yield by cutting off young plants, cankering stems of some of the larger ones causing little potatoes, and hurts grade by black scurf on tubers"; Massachusetts, "General over the State, and rather severe in some instances, 8"; New York, 5; New Jersey, "Much less than usual on the sprouts"; Virginia, "Much more than usual, cool wet spring, 10"; Tennessee, 1; South Carolina, "One of the most important diseases attacking potatoes in the State. Most of the seed received from the North is heavily infected and climatic conditions during early growth are ideal for disease development. Experiments with seed treatment increased yields as much as 14 percent. Loss 3 percent."; Georgia, "Found in all fields inspected where untreated seed had been planted or where grown in old potato fields"; Florida, 4; Texas, 0.5; Ohio, more, wet, 3; Michigan, "Much more, high humidity and low temperature, 1 percent reduction in yield"; Wisconsin; Minnesota, 4 percent loss; Iowa, 3; North Dakota, more, 1.5; South Dakota, 5; Kansas, "More severe injury than for several years due to spring conditions favorable to the disease and lack of seed treatment"; Montana, 3; Wyoming, more, 3; Washington; Oregon, 5.

STEM END ROT (Fusarium solani var. eumartii). Michigan and Wyoming.

WILT (Fusarium oxysporum). New York, trace; Maryland, "Much less than

in an average year, 3 percent loss"; Texas, 0.5; Ohio, 1; Michigan, less, 1; North Dakota, less, 1; Kansas, only a trace; Wyoming, 1.

WILT (Fusarium sp.). Minnesota, 4 percent loss; South Dakota, 2; Montana, 2; Oregon, 2.

DRY ROT (Fusarium spp.). New York, trace to 1 percent; New Jersey; Florida; Texas; Washington.

"Z" disease (Fusarium sp.?). New York, "Of no importance except in western part of the State. Has been observed in Canada."

WILT (Fusarium sp.?). Wisconsin, "Less prevalent than last year or in an average year. Cause not definitely determined, may be associated with yellow dwarf."

STEM BLIGHT (Phoma sp.). New York, trace, found only on otherwise weakened plants.

ROOT ROT (Phymatotrichum omnivorum). Texas.

LATE BLIGHT (Phytophthora infestans). Maine, 8 percent loss; Vermont, "More than in an average year or in 1934. Infection came late, Bordeaux spraying was effective to an unusual degree. The chief loss was in small uncared-for fields. There was little rot in Champlain Valley which was very dry so that plants ripened prematurely and were not good blight subjects. Estimated reduction in yield for the State as a whole 25 percent"; Massachusetts, "First observed at the unusually early date of July 27 but due no doubt to the hot dry weather of August it was less damaging than in many previous years, 3"; Connecticut, "Appeared early but due to hot dry weather of late summer did little damage"; New York, "Much more than in 1934 and more than in average years, generally distributed in nearly all parts of the State, 5"; (See P. D. R. 19:289). Pennsylvania, much more, 8; Maryland, "Very severe losses in Garrett County. None on the early crop on the Eastern Shore, 5"; West Virginia, much more, 3; South Carolina, none in 1935; Georgia, "Found only in Rabun County, reduced yield about 30 percent. Occurred in this field the previous fall"; Florida, "Much less, maximum infection a trace"; Texas, trace; Ohio, trace; Michigan, only one report; Wisconsin, not seen, too dry; Minnesota, "Not seen although rainfall was higher than usual, summer temperatures were probably too high"; Iowa, no injury; Kansas, "First record in the State, developed from seed potatoes from Maine, rainy and cloudy during the brief period disease was evident, some defoliation, loss not severe"; Washington; California.

STEM ROT (Sclerotinia minor ?) caused considerable loss in one field in Humboldt County, California.

SCLEROTINIA ROT (Sclerotinia sclerotiorum). New York, "Trace of

tuber rot, following susceptible vegetable crops on muck soils"; Florida, "0.1 percent loss with a maximum incidence of 60 percent."

STEM ROT (Sclerotium rolfsii). Florida; Mississippi; Louisiana; Texas; Arkansas.

SILVER SCURF (Spondylocladium atrovirens). New York, "Usual trace, mostly of importance only when potatoes are washed before selling. Early digging and cold storage almost completely control the disease"; New Jersey, not common; Washington; California.

POWDERY SCAB (Spongospora subterranea) is still found rarely in the Adirondack regions of New York where the soil is cold and wet.

VERTICILLIUM WILT (Verticillium albo-atrum). New York, "Trace, found rarely when isolations are made"; Michigan, "no reports".

BLACK LEG (Bacillus phytophthorus). Maine, 2 percent loss; New Hampshire, "Less than usual, commonly found only in Coos County"; Vermont, "Less, rarely plentiful enough to cause commercial loss"; Massachusetts, trace; New York, "More. Much reported from Long Island and to some extent in Wyoming County, loss a trace"; New Jersey, "Reported as very severe in Mercer County"; Maryland, trace; Virginia, "Much more, associated in several sections with Maine seed, 10 percent loss, maximum incidence 50 percent"; Georgia, "Found 50 to 60 percent in small fields near Athens"; Florida, much less, 0.1; Mississippi; Texas; Ohio, more, 2; Michigan, "More, rotting in fields of table stock common in late fall, 2.5"; Wisconsin; Minnesota, "More, moisture due to frequent rains favored the disease"; Iowa, 1; North Dakota, more, 2; South Dakota, 0.5; Kansas, trace; Montana, trace; Wyoming, 2; Oregon, 3.

BACTERIAL WILT (Bacterium solanacearum). North Carolina, "Reported from eastern counties, abundant in Granville, Wake, and Durham counties"; Florida, "Much more prevalent than usual, 7 percent loss with maximum incidence of 100 percent"; Illinois, "Found in Morgan County where it was reported causing severe losses. Cultures were made to aid in diagnosis."

ROOT KNOT (Heterodera marioni). New York, Florida, Mississippi, and Texas.

GIANT HILL (virus). Reported by New York and Michigan, each, traces only.

LEAF ROLL (virus). Maine, 3 percent; New Hampshire; Vermont, "More, a rough estimate of 20 percent reuction in yield for all fields. An additional 5 percent estimate for loss in grade is based on net necrosis coming from new infections of leaf roll"; Massachusetts, "General, most destructive in uncertified seed plantings, loss 3 percent"; Connecticut; New York,

"Rather localized, more than usual in Elba County, the usual amount or less in the State as a whole, 3"; Pennsylvania; Maryland, "Usual amount, more than in 1934, 2.5"; West Virginia, 10; Tennessee, trace; Georgia, "90 percent in one field grown from non-certified seed in Clarke County"; Texas; Ohio, general; Michigan, 1; Wisconsin; Iowa, 5; North Dakota, 1; South Dakota, 0.2; Montana, trace; Washington; Oregon, 4.

CRINKLE MOSAIC (virus). Wisconsin and Washington.

MILD MOSAIC (virus). Georgia, "75 percent in several fields in Clarke County planted with non-certified seed"; Arkansas; Michigan, trace; North Dakota, 1.

MOSAIC (virus). Maine, 5 percent; New Hampshire, 2; Vermont, "More than in 1934. Most of the mosaic in Green Mountains is mild mosaic, 15"; Massachusetts, 5; New York, 2; New Jersey, prevalent; Maryland, less than average amount, 2; Tennessee, 2; South Carolina, trace; Florida, 1 to 10; Louisiana; Texas, 2; Iowa, 12; South Dakota, 1; Kansas, trace; Montana, 5; Wyoming, 5; Washington; Oregon, 10.

RUGOSE MOSAIC (virus). Michigan, trace; Florida; Wisconsin; California.

SPINDLE TUBER (virus). New York, trace; Maryland, 0.5; Michigan, trace; Iowa, 2; Kansas, 2; Wyoming, 2.

STREAK (virus). New York, trace.

YELLOW DWARF (virus). Vermont, "More, of little economic importance but possibly of interest as showing a slight increase in the State. First noted about 1923-24"; Massachusetts, "Trace, observed for the first time in the State on three or four farms, seed all from the same source in up-state New York"; New York, more, 1; Maryland, trace; Ohio, trace; Michigan, 0.2; Wisconsin, "Loss in central area less than last year; in Milwaukee area much more extensive"; Wyoming.

MISCELLANEOUS VIROSES (virus). Curly dwarf was reported from Connecticut and Texas; Minnesota estimated 5 percent loss from virus diseases and South Dakota 5 from viroses other than mosaic.

HOPPER BURN and TIP BURN (Leaf hoppers and drought). Massachusetts, 8 percent injury; Connecticut; New York, 10; Maryland, 1; Tennessee, 5; Texas, 0.5; Arkansas, prevalent as in most years; Ohio, less, 5; Michigan, less, 3.5; Wisconsin; Minnesota, less, higher humidity than usual, 5; Iowa, 5; North Dakota, 0.2; South Dakota, 1; Montana, trace; Oregon, 3.

PSYLLID YELLOWS (due to injury caused by potato psyllid). Colorado; New Mexico, "One of the most important diseases attacking the crop, especially severe this season."

BLACK HEART (non-parasitic). New York, Texas, and Wisconsin.

CALICO (undetermined). North Dakota, first report.

"HAYWIRE" (undetermined). Louisiana, "Common in plantings of Nebraska seed stocks."

HOLLOW HEART (non-parasitic). Wisconsin, "Much more than in 1934 and more than usual due to rapid growth in September after dry August."

LIGHTNING INJURY (lightning). New York; West Virginia, observed in an area thirty feet in circumference.

"MORON" (undetermined). Michigan.

NET NECROSIS (various causes). New York, trace; New Jersey, "Three different lots showed severe cases"; Iowa, more than usual, 3 percent; California.

SPINDLING SPROUT (various causes). New York and Michigan, each, the usual trace.

STEM END ROT (undetermined). Wisconsin reported this trouble of unknown origin, possibly associated with yellow dwarf.

SUN SCALD (non-parasitic). New Jersey and Wisconsin.

TUBERS BUT NO TOPS (non-parasitic). Washington.

SPINACH. See SPINACIA OLERACEA

SPINACIA OLERACEA. SPINACH

LEAF SPOT (*Cercospora beticola*). New York and Texas.

ANTHRACNOSE (*Colletotrichum spinaciae*). Mississippi and Texas.

WILT (*Fusarium* sp.). Texas.

LEAF SPOT (*Heterosporium variable*). California, "Serious in some fields at cutting time.

DOWNY MILDEW (*Peronospora effusa*). Massachusetts, "Only mere traces observed in the fall seedings, less than in the average year, rarely seen

in the spring seedings"; Connecticut; New York, "More than in the past two years, 20 to 100 percent losses on a few farms"; New Jersey; Maryland, 0.5; Virginia, "Much more, moderate losses in spring crop and severe losses in fall crop in some sections, reduction in yield 5 percent, loss in grade 10, maximum indicence 100"; Texas, 10; California.

DAMPING OFF (Pythium sp.). Virginia, "Much more than in 1934. The loss would have been very heavy except for the fact that most of the seed was treated. Average loss 2 percent."

DAMPING OFF (Rhizoctonia sp.). Washington.

DAMPING OFF (various fungi). Massachusetts and Ohio.

CURLY TOP (virus). Oregon, 5 percent loss.

MOSAIC (virus). Maryland, more than usual, 2 percent loss; California, cucurbit mosaic virus.

YELLOWS (virus). New York, "Caused loss to longstanding varieties, total loss on some farms"; New Jersey.

MALNUTRITION (Magnesium deficiency). New Jersey.

SQUASH. See CUCURBITA MAXIMA

SUMMER SQUASH. See CUCURBITA PEPO CONDENSA

SWEET POTATO. See IPOMOEA BATATAS

SWISS CHARD. See BETA VULGARIS CICLA

TOMATO. See LYCOPERSICUM ESCULENTUM

TRAGOPOGON PORRIFOLIUS. SALSIFY

WHITE RUST (Albugo tragopogonis). New York and Wisconsin.

LEAF SPOT (Sporodesmium scorzonerae). New York.

YELLOWS (virus). New York, caused slight loss, less than 1 percent.

TURNIP. See BRASSICA RAPA

WATERMELON. See CITRULLUS VULGARIS

YAM. See DIOSCOREA SATIVA

DISEASES OF SPECIAL CROPS

ARACHIS HYPOGAEA. PEANUT

LEAF SPOT (*Cercospora personata*). North Carolina, "Abundant but apparently not of serious economic importance"; Tennessee, "Caused premature defoliation sufficient to result in shriveled kernels in some fields"; Texas, 2 percent injury.

STEM ROT (*Corticium vagum*). North Carolina, "Very abundant and a serious disease of stolons and nuts, especially prominent in poorly drained areas."

DIPLODIA ROT (*Diplodia natalensis*). Texas.

WILT due to a *Fusarium* reported as *F. vasinfectum* occurred in scattered localities in North Carolina. It was not serious in any area. *Fusarium* sp. causing a trace of loss was reported from Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, 3 percent loss.

STEM ROT (*Sclerotium rolfsii*). North Carolina, "Loss of plants not severe but considerable loss of nuts in heavily infested areas"; Texas, 2 percent.

BACTERIAL WILT (*Bacterium solanacearum*). North Carolina, "This crop is not very susceptible to bacterial wilt. It grows successfully on soils where tobacco and tomatoes are killed. The loss in peanuts varies from 1 to 5 percent on heavily infested soils."

NEMATODE (*Cephalobus elongatus*). Tennessee.

CHLOROSIS (excess lime). Texas.

COTTON. See GOSSYPIUM HIRSUTUM

GINSENG. See PANAX QUINQUEFOLIUM

GOSSYPIUM HIRSUTUM. COTTON

LEAF SPOT (*Alternaria* sp.) was very prevalent, as usual, following non-parasitic rust and in potassium-deficient soils in Louisiana, and was reported from Arizona and Puerto Rico.

LEAF SPOT (*Cercospora althaeina*). Texas.

SORESHIN (*Corticium vagum*). Georgia, Louisiana, Texas, Arkansas. Poor stand and poor growth due to damping-off caused by *Rhizoctonia* and other fungi was very severe in western Arkansas where it was favored by very wet and cold weather in May and early June.

BOLL ROT (*Diplodia gossypina*). Louisiana and Texas.

BOLL ROT (*Fusarium moniliforme*) was favored by prolonged periods of rain in late August and early September and caused heavy losses in many sections of eastern and southeastern South Carolina.

SEEDLING BLIGHT and ROOT ROT (*Fusarium moniliforme*) caused serious injury in Georgia especially on certain lots of seed where losses ranged from 6 to 90 or even 100 percent. The loss for the State was estimated at 5 percent. Some of this was due to *Rhizoctonia* and to *Sclerotium* but most of it was caused by the *Fusarium*. (P.D.R. 19:252).

WILT (*Fusarium vasinfectum*). Tennessee, generally distributed, loss 1.5 percent; North Carolina, "Occurred in isolated areas on Norfolk sandy soils but was less severe than in 1934"; South Carolina, 2; Georgia, "Much more than usual in northern part of State, 5; Mississippi; Louisiana, "Disease is being satisfactorily controlled by planting wilt-resistant varieties and using balanced fertilizers"; Texas, 5; Arkansas, 5. (P.D.R. 19:252; 20:87).

LEAF SPOT and BOLL ROT (*Fusarium* sp.). Louisiana.

NEW WILT (*Fusarium* sp. ?). A type of wilt of undetermined cause but suspected to be due to *Fusarium* was reported from Texas.

ANTHRACNOSE (*Glomerella gossypii*). Virginia, 3 percent loss; Tennessee, trace; North Carolina, "Anthracnose was rare and of no serious importance"; South Carolina, "The loss from anthracnose is chiefly in reduced stands. Seed treatments indicate about a 10 percent loss. Boll rot is generally not important"; Mississippi, "Generally distributed but less prevalent than usual because of dry season"; Louisiana, "Being controlled with resistant varieties and disease-free seed"; Texas; Arkansas, trace.

STEM BLIGHT (*Macrophoma* sp.). Georgia.

LEAF SPOT (*Mycosphaerella gossypina*). Mississippi, Louisiana, and Texas.

BOLL ROT (*Olpitrichum carpophilum*). Louisiana.

RUST (*Puccinia schedonnardi*). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, on both cultivated and Arizona wild cotton; Arkansas, reported from a very limited area in the southwestern part of the State.

DAMPING OFF (*Pythium* sp.). Texas.

SEEDLING STEM ROT (*Sclerotium rolfsii*). Georgia and Texas.

VERTICILLIUM WILT (*Verticillium albo-atrum*). Reported from Tennessee as less prevalent than usual, and much less so than in 1934; Mississippi, and Arkansas. The fungus causing this disease has usually been called *V. albo-atrum* and was reported under that name from Tennessee, as *Verticillium* sp. from Arkansas, and as *V. dahliae* from Mississippi.

ANGULAR LEAF SPOT (*Bacterium malvacearum*). Virginia, 4 percent loss; Tennessee; North Carolina, "Prevalent, caused considerable leaf injury especially on young plants"; Georgia, "Seen in all fields inspected"; Mississippi, "Much less serious than anticipated from the serious epiphytotic of 1934, much seed treatment; locally abundant and serious on many properties where seed was not treated; dry weather later held damage in check"; Texas, 3 percent loss from leaf spot and 6 percent from boll rotting; Arkansas; Arizona, "The first extensive natural infection of upland cotton in this State, none on sulphuric-acid-delinted seed."

ROOT KNOT (*Heterodera marioni*). Georgia, "Heavy infestation in a field in gray sandy land in Walton County"; Texas; Arkansas.

MOSAIC (virus). Texas.

MALNUTRITION (Potash deficiency). Virginia, "Five percent loss, magnesium deficiency also involved"; Tennessee, 12; North Carolina, "Severe in both Piedmont and Coastal Plain areas. For past few years has caused unexpectedly heavy losses in Cecil sandy loam soils throughout the Piedmont counties"; Georgia, "Always some loss, in all cases on poor, gray land"; Mississippi, "More evident than usual, very dry weather"; Arkansas, "Cause of severe loss in many sandy alluvial soils, 3 percent loss" (P.D.R. 19:102).

POOR GERMINATION (various causes). Georgia, North Carolina. (P.D.R. 19:103; 20:126).

HOPS. See HUMULUS LUPULUS

HUMULUS LUPULUS. HOPS

The occurrence of hop diseases on the Pacific Coast in 1934 and 1935 was reported by G. R. Hoerner (P.D.R. 20:48-52. 1936).

POWDERY MILDEW (*Sphaerotheca humuli*). Connecticut.

MENTHA PIPERITA. PEPPERMINT

WILT (*Verticillium* sp.). Michigan.

LEOPARD SPOT (undetermined). This disease, previously reported as serious in Indiana, was found in two localities in Michigan.

NICOTIANA TABACUM. TOBACCO

(See also P.D.R. 19:192-194; 295-299. 1935).

POLE ROT (*Alternaria tenuis*). A type of pole rot with which this organism was constantly associated was reported from Connecticut.

LEAF SPOT (*Colletotrichum destructivum*). Kentucky.

FROG EYE (*Cercospora nicotianae*). Kentucky; Tennessee, 5 percent loss; North Carolina, "Abundant throughout the State; caused some loss in the eastern part; causes a darker brown spot on tobacco grown on heavy soils than on sandy soil."

DAMPING-OFF and SORE SHIN (*Corticium vagum*). Massachusetts, "Present in several early-planted seed beds in wet places"; Connecticut, "A slimy bed rot that occurs when the plants are ready to set out and is sometimes very destructive was not very serious this season"; North Carolina, "Worse than usual, large areas of tobacco affected"; Georgia; Wisconsin.

DAMPING-OFF (*Fusarium* sp.). Massachusetts.

FUSARIUM WILT (*Fusarium oxysporum nicotianae*). Maryland, trace; Kentucky; Tennessee; North Carolina.

DOWNY MILDEW (*Peronospora tabacina*). Pennsylvania, Maryland, Virginia, Tennessee, North Carolina, South Carolina, Georgia, and Florida.

DAMPING-OFF (*Pythium* sp.). Massachusetts; Connecticut, (*P. debaryanum*) "Also caused root rot and stalk rot of older plants"; Georgia; Wisconsin.

BLACK SHANK (*Phytophthora parasitica nicotianae*). Kentucky; Tennessee; North Carolina, "Spreading in the State. Growers are alarmed and many have begun to grow other crops on infested soils. So far tobacco seems to be the only host in the State"; Florida, "Appeared early; in general resistant varieties are planted thereby reducing losses."

STEM ROT (*Sclerotium rolfsii*). North Carolina, much less damage than usual.

BLACK ROOT ROT (*Thielaviopsis basicola*). Massachusetts, "Observed early in spots, little obvious injury"; Connecticut; Pennsylvania, comparatively unimportant; Maryland, trace; Virginia, "Injury on infested soils much more pronounced than usual"; Kentucky; Tennessee, "In the Burley belt of eastern Tennessee a rapid extension of severe infection was noted and damage was serious; resistant varieties are supplanting others; 4 percent loss"; North Carolina, "The problem is being solved by maintaining a normal soil reaction by avoiding liming and by use of resistant varieties"; Wisconsin.

SOFT ROT (*Bacillus carotovorus*). North Carolina, "Occurred spasmodically on maturing tobacco during wet periods in July."

ANGULAR LEAF SPOT, BLACK FIRE (*Bacterium angulatum*). Massachusetts, "Not very injurious"; Connecticut, "Not increasing in prevalence and not serious"; Pennsylvania, "Does not occur or is at least extremely rare in the State"; Maryland, trace; Virginia, "Caused less injury than usual in the Burley Section of southeastern Virginia, but was more severe than in 1934 on the dark tobacco"; Kentucky, "Heavy infection in plant beds throughout the Burley section"; Tennessee, "Very severe in certain limited localities, 10 percent loss"; North Carolina, "Not severe anywhere in the State"; Wisconsin, "Generally present to some extent in 50 percent of the seed beds, not much field infection".

BACTERIAL WILT (*Bacterium solanacearum*). Virginia, "More prevalent than ever before, apparently on the increase in the State"; North Carolina, "Severe but not so destructive as in 1934."

WILD FIRE (*Bacterium tabacum*). Massachusetts, very little, Connecticut, "Has been on the decline for several years until in 1934 it was seen on only one farm, this year it was found seriously affecting a dozen or more fields"; Pennsylvania, "About 25 percent of the seed beds were affected which is less than usual"; Maryland, "More prevalent than usual, loss 2.5 percent"; Virginia, "Observed for the first time in recent years"; Kentucky, "Very serious in some cases, generally observed throughout the western part of the State"; Tennessee, "Serious in western part of the State"; Wisconsin, "Less, no detailed survey, disease known to exist only in two seed beds near Janesville."

ROOT KNOT (*Heterodera marioni*). Kentucky; North Carolina, "Less damage than usual, little activity during June while soil was dry and development in July was too late to cause much injury"; South Carolina, "Did not develop until a large part of crop was harvested"; Georgia, "Much less damage than usual"; Florida, "Large knots are not usually found, but stunted plants and general injury are common."

MOSAIC (virus). Massachusetts, "Prevalent but not so injurious as in former years"; Connecticut, "Seen in only one seed bed"; New Jersey, "Severe

in several plantings, but not the cause of serious losses"; Maryland, loss 7 percent; Virginia, "Very prevalent and severe in the bright tobacco sections; increasing"; Kentucky, rather more prevalent; North Carolina, "Very severe especially in eastern counties, traced in most cases to the use of chewing tobacco around plant beds"; Florida, "Not serious in shade tobacco, trace"; Wisconsin, "Ordinary mosaic in about the usual amount; less than usual of the cucumber-mosaic-virus type."

RING SPOT (virus). Pennsylvania, "Uncommonly extensive on experimental plantings near Lancaster. The chief perennial weed in the vicinity, Canada thistle, showed symptoms of what appeared to be this disease"; Maryland, trace; Virginia, more common than usual.

BROWN ROOT ROT (undetermined cause). Wisconsin, "Occurred in small percentage of fields; less prevalent than formerly due to less general planting on sod-land."

DROUGHT SPOT (undetermined). Kentucky and North Carolina.

FIRING (non-parasitic). Kentucky, "Severe on Burley tobacco in western part of the State"; Tennessee, "Severe in nine fields in the Greenville section."

FRENCHING (non-parasitic). Maryland, trace; Kentucky, more prevalent than usual; Tennessee.

P A N A X Q U I N Q U E F O L I U M. G I N S E N G

BLIGHT (Alternaria panax). Pennsylvania; West Virginia, severe in five-year-old plants.

ROOT ROT (Phytophthora sp.). Washington.

PEANUT. See ARACHIS HYPOGAEA

PEPPERMINT. See MENTHA PIPERITA

TOBACCO. See NICOTIANA TABACUM

DISEASES OF SUGAR CROPS

BETA VULGARIS. SUGAR BEET

LEAF SPOT (*Cercospora beticola*). Ohio, 8 percent loss; Michigan, "Much more than usual, 25 percent loss"; Wisconsin, "Much more, locally bad in fields where seeding had been early"; Minnesota, much more; Iowa, more, 27 percent; South Dakota, trace; Montana, trace.

ROOT ROT (*Corticium vagum*). Wisconsin, more than in 1934, less than in an average year; Minnesota; Iowa, 5 percent.

ROOT ROT (*Phoma betae*). Ohio, 1 percent; Michigan, usual trace; Wisconsin, less than usual but more than in 1934; Minnesota, much more than last year or in average years with the usual amount of leaf spot.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

DAMPING OFF (*Pythium debaryanum*). Iowa, 12.5 percent loss.

DAMPING OFF (various fungi). Minnesota, more prevalent than usual, spring cold and wet; Iowa, loss 10 to 15 percent.

TUMOR (*Bacterium beticola*). Iowa reported a trace of trouble probably due to this cause. It was more prevalent than usual.

CURLY TOP (virus). Montana, Utah, and California.

SACCHARUM OFFICINARUM. SUGAR CANE

RED ROT (*Colletotrichum falcatum*). Mississippi; Louisiana, "Less than usual, with the reduction in the amount of J 213, J 36, J 36 M, and CP 807 grown over the sugar section red-rot damage is being reduced."

CYTOSPORA DISEASE (*Cytospora sacchari*). Louisiana, scattered.

ROOT DISEASE (*Pythium arrhenomanes*). Louisiana, "Less prevalent than formerly; most varieties being grown commercially are resistant."

RED STRIPE (*Bacterium rubrilineans*). Louisiana, only traces observed.

MOSAIC (virus). Mississippi, usual amount; Louisiana, Becoming less general where new resistant varieties have been introduced.

SUGAR BEET. See BETA VULGARIS

SUGAR CANE. See SACCHARUM OFFICINARUM

D I S E A S E S   O F   T R E E S

A B I E S   spp.   F I R

NEEDLE CAST (*Hypodermella abietis-concoloris*). California, on *A. concolor*, white fir.

LEAF RUST (*Peridermium balsameum*). Connecticut, on *A. balsamea*, balsam fir, one report, unusual host in the State.

NEEDLE BLIGHT (*Rehmiellopsis bohemica*) British Columbia on *Abies lasiocarpa*, Maine on *A. balsamea*.

DIE-BACK (*Sphaeropsis* sp.). New York on *A. concolor*.

DIE-BACK (*Sphaeropsis malorum*). Maryland on *A. concolor*.

A C E R   sp.   M A P L E

CANKER (*Cytospora* sp.). Massachusetts, on *Acer palmatum* and *A. rubrum*; New Jersey, on *A. platanoides*.

WHITE STREAKED ROT (*Fomes applanatus*). Massachusetts.

WHITE SAPWOOD ROT (*Fomes fomentarius*). Massachusetts.

WHITE HEART ROT (*Fomes igniarius*). Massachusetts.

ANTHRACNOSE (*Gloeosporium apocryptum* and *Gloeosporium* sp.). Massachusetts, *G. apocryptum* on *A. saccharinum* in epiphytotic form in the southwestern part of the State, and on *A. saccharum*, more severe than in 1934, caused tree wardens some alarm. *G. apocryptum*, New Jersey. *Gloeosporium* sp., Virginia; Kentucky, on white, red, and hard maples, severe.

NECTRIA CANKER (*Nectria ditissima* /*cinnabarina*/). Massachusetts; on *A. palmatum*, *A. platanoides*, *A. pseudoplatanus*, *A. saccharinum*, and *A. saccharum*. See also P.D.R. 19:16-17.

CANKER (*Phomopsis* sp.). New Jersey, on *A. palmatum*.

LEAF SPOT (*Phyllosticta acericola*). New Jersey, on *A. platanoides*.

LEAF SPOT (*Phyllosticta minima*). Massachusetts; Tennessee, very severe on 20,000 trees of nursery stock in Warren County.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, on *A. negundo* and *Acer* spp.

TAR SPOT (Rhytisma acerinum). Massachusetts, common on Acer spp. especially on some upland forest species such as A. rubrum and A. spicatum; Connecticut, on A. saccharinum, cut leaf, and A. rubrum; North Carolina, abundant; Michigan, much less prevalent, no cases observed or reported; Wisconsin, mostly on soft maple; Iowa, less than usual.

TAR SPOT (Rhytisma punctatum). Massachusetts, on A. rubrum, A. saccharum, A. spicatum, and Acer spp.

DIE BACK (Steganosporium pyriforme). New Jersey, on A. platanoides.

LEAF BLISTER (Taphrina sp.). On A. saccharum, Massachusetts, one case; Arkansas, common and disfiguring,on Acer spp.; Virginia, unusually severe; Tennessee, common in eastern and central part of the State.

POWDERY MILDEW (Uncinula circinata). New Jersey.

WILT (Verticillium dahliae). New Jersey, on A. platanoides; Pennsylvania, on A. platanoides, much more prevalent than usual, more severe in eastern and central part of the State; California, on A. macrophyllum.

WILT (Verticillium sp.). Massachusetts, on A. saccharum and other species, most important fungous parasite of maples in the State, not as outstanding in 1935 as in 1933 and 1934 following two severe winters; Connecticut, on A. platanoides, A. rubrum, A. saccharum, and A. palmatum; Michigan, general over lower peninsula on shade maples in cities and towns.

CHLOROSIS (excess lime). Texas on A. negundo and other species.

A E S C U L U S   H I P P O C A S T A N U M.   H O R S E C H E S T N U T

LEAF BLOTCH (Guignardia aesculi). Massachusetts, trees prematurely defoliated, very few in Connecticut Valley not infected; Connecticut; New Jersey, general; Pennsylvania, abundant, often severe; Maryland; District of Columbia, heavy infection prevalent; Virginia; Texas; Ohio, severe defoliation; Michigan, usual amount.

NECTRIA CANKER (Nectria ditissima /cinnabarina/). Massachusetts, apparently the first report from the State. It was not collected or seen during past ten years. Twigs with appearance of Nectria infection placed on soil under leaves in the fall developed perithecia plentifully by December.

POWDERY MILDEW (Uncinula flexuosa). Maryland.

A L B I Z Z I A   J U L I B R I S S I N.   M I M O S A   T R E E

WILT (Fusarium sp. associated). North and South Carolina. (P.D.R. 20:177-178).

A L E U R I T E S   F O R D I I.   T U N G   O I L   T R E E

CROWN ROT (Diplodia natalensis). Texas.

STEM ROT (Sclerotium rolfsii). Texas.

ROOT KNOT (Heterodera marioni). Texas.

A M Y G D A L U S   sp.

LEAF SPOT (Phyllosticta sp.). Puerto Rico, on bitter almond, always present, very abundant.

RUST (Tranzschelia pruni-spinosae). California, on ornamental peach.

A R B U T U S   M E N Z I E S I I.   M A D R O N E

LEAF SPOT (Mycosphaerella arbuticola). California, causing defoliation of native trees in Sonoma County.

B E T U L A   spp.   B I R C H

SAP and HEART ROT (Merulius tremellosus). Massachusetts, on B. lutea.

NECTRIA CANKER (Nectria spp.). Massachusetts, on B. populifolia, B. lutea, and Betula spp., becoming more prevalent; in one gray birch stand, 10 percent of the mature tree trunks bore Nectria cankers as diagnosed by culturing. See also P.D.R. 19:16-17.

BARK CANKER (Phomopsis sp.). Massachusetts, on B. populifolia.

POWDERY SAPWOOD ROT (Polyporus betulinus). Massachusetts on B. populifolia.

Sclerotinia betulae. Maryland, on B. nigra.

LEAF BLISTER (Taphrina sp.). Maine on B. lutea.

C A S T A N E A   D E N T A T A.   C H E S T N U T

BLIGHT (Endothia parasitica). Connecticut "Ten reports, but on seedlings and sprouts showing less injury each year"; New Jersey "Root sprouts and trunk suckers seem to be getting bigger before being killed, several reported bearing burrs"; California "First occurred in 1934 in San Joaquin County, a few additional trees in 1935 in San Joaquin and Alameda Counties, all have been eradicated. (Complete report in Calif. Monthly Bull. 24:173. 1935)."

STRUMELLA CANKER. See P.D.R. 19:17.

C A S T A N E A P U M I L A. C H I N Q U A P I N

CANKER (*Endothia parasitica*). Massachusetts.

C A T A L P A spp. C A T A L P A

LEAF SPOT (*Phyllosticta* sp.). Connecticut; New Jersey (*P. catalpae*).

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

C E D R E L A sp. C E D R E L A

CANKER (*Cytospora* sp.). Virginia.

C E D R U S D E O D A R A. D E O D A R

CANKER (*Sphaeropsis* sp.). Virginia.

C E L T I S sp. H A C K B E R R Y

ROOT ROT (*Armillaria mellea*). Texas.

LEAF SPOT (*Cylindrosporium defoliatum*). Texas.

MISTLETOE (*Phoradendron flavescens*). Texas.

CROWN ROT (*Thelephora retiformis*). Texas.

POWDERY MILDEW (*Uncinula polychaeta*). Texas.

C E R C I S sp. R E D B U D

CANKER (*Botryosphaeria* sp.). District of Columbia on *C. canadensis*.

LEAF SPOT (*Cercospora cercidicola*). Tennessee, very abundant on 20,000 trees in a nursery in Warren County; Texas.

CANKER (*Diplodia* sp.). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, on *C. occidentalis*.

TWIG CANKER (*Valsaria insitiva*). Texas.

C I N N A M O M U M C A M P H O R A. C A M P H O R T R E E

CANKER and DIE-BACK (*Gloeosporium camphorae*). Mississippi.

C O R N U S sp.

BOTRYTIS BLIGHT (Botrytis cinerea). Massachusetts, "The buds of C. florida and fruit of C. paniculata were heavily infected with this fungus."

CANKER (Phoma corni). Massachusetts, prevalent on young, dead twigs of C. paniculata.

LEAF SPOT (Septoria cornicola). Tennessee and Mississippi on C. florida.

C R A T A E G U S spp. H A W T H O R N

LEAF SPOT (Entomosporium thuemenii). New Jersey, on C. oxyacantha.

RUST (Gymnosporangium globosum). Connecticut; New Jersey, on C. oxyacantha; Wisconsin.

BLIGHT (Bacillus amylovorus). Connecticut; New Jersey, on C. oxyacantha.

C U P R E S S U S spp. C Y P R E S S

LEAF BLIGHT (Macrophoma cupressi). Texas, on C. pyramidalis.

TWIG BLIGHT (Pestalozzia funerea). Texas, on C. arizonica, C. pyramidalis, and C. sempervirens.

PHOMOPSIS BLIGHT (Phomopsis juniperovora). Texas, on C. sempervirens.

ROOT ROT (Phymatotrichum omnivorum). Texas, on C. arizonica and Cupressus sp.

D I O S P Y R O S sp. P E R S I M M O N

DRY ROT (Diplodia sp.). Texas.

ANTHRACNOSE (Gloeosporium diospyri). Texas.

ROOT ROT (Phymatotrichum omnivorum). Texas.

TWIG BLIGHT (Physalospora obtusa). Texas.

CHLOROSIS (excess lime). Texas.

F A G U S sp. B E E C H

NECTRIA CANKER (Nectria cinnabarina [galligena]). Massachusetts, "Appeared in numerous places after the severe winter of 1933-34, if it continues to spread it will do serious injury to our shade beeches." See also P.D.R. 19:16-17.

Scorias spongiosa. Tennessee.

STRUMELLA CANKER (Strumella sp.). See P.D.R. 19:16-17.

F R A X I N U S spp. A S H

WHITE HEARTWOOD ROT (Fomes fraxinophilus). Massachusetts; North Dakota, on F. pennsylvanica lanceolata.

ANTHRACNOSE (Gloeosporium aridum). Massachusetts, Virginia.

LEAF SPOT (Phyllosticta viridis). Texas, on F. lanceolata.

RUST (Puccinia peridermiospora). Massachusetts, more common than in 1934; Connecticut, on F. americana; Texas.

LEAF SPOT and TWIG BLIGHT (Septoria fraxini). Massachusetts.

TWIG BLIGHT (Sphaerographium fraxini). Massachusetts, on F. americana, observed at three different stations, new for the State.

CANKER (Sphaeropsis sp.). New Jersey, on F. americana, scattered infection, one large tree observed covered with cankers on younger twigs.

LEAF SPOT (undetermined). Virginia, unusually severe.

LEAF SCORCH (undetermined). Texas.

G I N K G O B I L O B A. M A I D E N H A I R T R E E

LEAF SPOT (Phyllosticta ginkgo). Pennsylvania.

ROOT ROT (Phymatotrichum omnivorum). Texas.

G L E D I T S I A T R I A C A N T H O S. C O M M O N H O N E Y - L O C U S T

CANKER (Dothiorella sp.). Mississippi.

H I C O R I A sp. H I C K O R Y

STRUMELLA CANKER (Strumella sp.). See P.D.R. 19:16-17.

I L E X spp.

LEAF SPOT (*Cercospora ilicicola*). Texas.

CANKER (*Diaporthe eres*). Oregon, see P.D.R. 19:18 under *Phomopsis crustosa*.

ANTHRACNOSE (*Gloeosporium* sp.). Texas.

CANKER (*Phomopsis crustosa*). Oregon.

POWDERY MILDEW (*Phyllactinia corylea*). Tennessee, on *I. opaca*.

LEAF SPOT (*Phyllosticta* sp.). New Jersey.

TAR SPOT (*Rhytisma* sp.). Virginia, on *I. opaca*.

LEAF SPOT (*Sphaeropsis* sp.). New Jersey.

CANKER (undetermined). Washington.

CHLOROSIS (excess lime). Texas, on *I. vomitoria*.

J U G L A N S S I E B O L D I A N A. J A P A N E S E W A L N U T

CANKER (*Melanconis juglandis*). Connecticut, (See also *Juglans* under diseases of nut crops).

J U N I P E R U S spp. J U N I P E R

CANKER (*Botryosphaeria berengeriana*). New Jersey, on *J. virginiana*.

WHITENING (*Cyanospora albicedrae*). Texas, on *J. mexicana*.

RUST (*Gymnosporangium clavipes*). Massachusetts, Delaware, and Mississippi.

RUST (*Gymnosporangium globosum*). New Hampshire, more than usual, the spring was wetter than usual and the fungus fruited freely; Massachusetts, some.

RUST (*Gymnosporangium juniperi-virginianae*) on *J. virginiana*: Massachusetts, "More galls and spore horns than seen in past years, galls opened exceptionally late. Five waves of spore formation, April 20, 27, 31, May 2, 12. Some galls produced three crops of spores"; Connecticut, less than in 1934, about the average amount; New Jersey, scattered infection; Delaware, "Very prevalent with spore horns mature April 18, still active June 6"; Texas, common; Wisconsin, "Usual amount, less than in 1934, only near apple plantings or susceptible wild varieties"; Iowa, less than usual; Kansas, "Galls very abundant but extremely small, probably due to hot dry weather of preceding summer."

BLIGHT (*Pestalozzia funerea*). Texas; California, "Caused heavy loss in stocks of small sizes of several varieties in one nursery."

BLIGHT (*Phomopsis juniperovora*). New Jersey, on *J. virginiana*; Texas, on *Juniperus* spp.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

LEAF SPOT (*Stagonospora* sp.). Texas.

LIRIODENDRON TULIPIFERA. TULIP TREE

NECTRIA CANKER (*Nectria* sp.). See P.D.R. 19:16-17.

LEAF SPOT (*Phyllosticta liriodendrica*). Massachusetts, "More severe than usual, 20 percent defoliation, favored by dry weather."

TAR SPOT (*Rhytisma liriodendri*). New Jersey.

MACLURA POMIFERA. OSAGE ORANGE

MISTLETOE (*Phoradendron flavescens*). Texas.

MAGNOLIA spp.

LEAF SPOT (*Alternaria* sp.). Texas.

LEAF SPOT (*Cephaleuros virescens*). Texas.

BLIGHT (*Corticium koleroga*). South Carolina.

LEAF SPOT (*Epicoccum nigrum*). Texas.

LEAF SPOT (*Exophoma magnoliae*). Texas.

LEAF SPOT (*Heterosporium magnoliae*). Texas.

LEAF SPOT (*Pestalozzia guepini*). Texas.

DIE-BACK (*Phomopsis* sp.). Pennsylvania.

LEAF SPOT (*Phyllosticta* sp.). Mississippi, *P. cookei* on *M. glauca*; Louisiana, *P. magnoliae* on *M. grandiflora*; Texas.

LEAF SPOT (*Septoria magnoliae*). Delaware, on *M. grandiflora*.

M A L U S spp.

RUST (*Gymnosporangium* sp.). New Jersey, *G. germinale* on flowering crab; Tennessee, *G. juniperi-virginianae* on *M. ioensis*; Alabama, *G. juniperi-virginianae* on *M. scheideckeri*; Mississippi, *G. germinale* on crab; Illinois, *G. globosum* and *G. juniperi-virginianae* on wild crab.

M E L I A A Z E D A R A C H. C H I N A B E R R Y

LEAF SPOT (*Cercospora meliae*). Texas.

TWIG BLIGHT (*Fusarium lateritium*). Texas.

TWIG BLIGHT (*Macrosporium* sp.). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

N Y S S A S Y L V A T I C A. S O U R G U M

STRUMELLA CANKER (*Strumella* sp.). See P.D.R. 19:16-17.

O S T R Y A V I R G I N I A N A. H O P H O R N B E A M

STRUMELLA CANKER (*Strumella* sp.). See P.D.R. 19:16-17.

P I C E A spp. S P R U C E

RUST (*Chrysomyxa cassandrae*). Wisconsin, on *P. mariana*, general in forest, not seen in nursery.

RUST (*Chrysomyxa ledicola*). Minnesota, on *P. glauca*, more prevalent than usual, generally distributed.

CANKER (*Cytospora* sp.). Massachusetts, on *P. excelsa*, *P. pungens*, and *P. pungens kosteri*; Vermont, on *P. pungens*; New York, on *P. orientalis* and *P. pungens*; New Jersey, on *P. excelsa*; Ohio.

RUST (*Melampsoropsis ledicola*). Maine on *P. glauca*.

RHIZOCTONIA TIP KILLING OF RED SPRUCE: Tip infection of red spruce (*Picea rubra* Link) was observed in the U. S. Forest Service Nursery at Parsons, West Virginia during the summer of 1935 and according to the nurserymen had occurred in previous seasons, but less extensively. The disease was found in both one-year (1-0) and two-year (2-0) old seedlings, but was more severe in the 2-0 seedlings; it was most prevalent in the more dense stands, but was not confined to them. In a few places in these beds where there were 150 or more seedlings per square foot it was not

unusual to find 75 percent or more of the seedlings with one or more infections. One of the most conspicuous symptoms of the disease was the bending of the infected stem tips, usually at about a right angle. Apparently the stem was attacked on one side near the tip, preventing further elongation on that side while the tissue on the opposite side of the stem continued to elongate for a time causing the tip to turn to one side. Soon after infection occurred near a given stem tip, either terminal or lateral, the portion of the stem beyond the point of infection gradually lost its normal green color, died and became brown. In some cases the stem tip died by the time it had reached an angle of 30° to 45° from the line of growth. Frequent rains occurred during the growing season at Parsons in 1935 and thus made conditions favorable for the spread of an organism from seedling to seedling by direct aerial growth of mycelium. Frequently in the more dense stands of 2-0 seedlings every stem-tip, both terminal and lateral, on a given seedling was killed. In some instances if the terminal bud was a few inches above the general level of the other seedlings in the bed it escaped injury while every lateral stem tip on that particular plant was dead. The disease stopped spreading when the shade was removed and the beds sprayed with Semesan (1 ounce in 3 gallons water). The drier condition due to shade removal was probably more effective than the single spray application in stopping the attack. In case of the 1-0 seedlings the shade was removed only temporarily and was put back over the seedlings after the rainy weather had ceased.

Numerous isolations from diseased specimens indicated that Rhizoctonia was the organism chiefly responsible for this tip infection. (Dennis H. Latham, Emergency Conservation Work, Division of Forest Pathology).

P I N U S sp. P I N E

ATROPELLIS CANKER (Atropellis pinicola). See P.D.R. 19:17. Ohio reported no specimens received during 1935.

SOOTY MOLD (Capnodium pini) on P. strobus: Massachusetts, affected young trees adversely, leaves and twigs under the sooty masses died; Connecticut.

Cenangium taeda. Alabama, common on dead branches of P. taeda.

RUST (Coleosporium solidaginis). Massachusetts; Connecticut, on P. banksiana (unusual host in the State), P. nigra austriaca (new host), and P. resinosa; New Jersey.

RUST (Cronartium comptoniae). New Hampshire, on P. sylvestris; Massachusetts, does not cause much injury; Connecticut, on P. nigra austriaca, P. rigida, and P. sylvestris.

RUST (*Cronartium quercuum*). Pennsylvania, on *P. sylvestris*; Mississippi, on *P. echinata*; Wisconsin, on *P. banksiana*.

BLISTER RUST (*Cronartium ribicola*) on *P. strobus*: Massachusetts; Connecticut; Maryland; West Virginia; Ohio; Indiana, first time observed for 18 years; Illinois, first occurrence in the State; Wisconsin, first reports from Iron and Waushara Counties, very heavy infection centers in Portage, Oneida, Bayfield, Washburn, Barron, Dunn, and Shawano counties.

CANKER (*Cytospora* sp.). Connecticut, on *P. ponderosa*; Vermont, on *P. excelsa*.

CANKER (*Dasyscypha ellisiana*). Massachusetts, common on trunks of *P. strobus*.

DAMPING OFF and SEEDLING ROOT ROT (*Fusarium* spp.). South Carolina, on *P. caribaea* seedlings in nurseries; Georgia, in U. S. Soil Conservation nurseries, on *P. caribaea*, loss 15 to 75 percent, on *P. palustris*, loss 5 to 15, on *P. taeda*, loss 10 to 30.

NEEDLE CAST (*Lophodermium pinastri*). Massachusetts, on *P. rigida* and *P. strobus*; New Jersey; Virginia, on *P. strobus*; Kentucky; Ohio, more prevalent than usual.

TWIG BLIGHT (*Macrophoma* sp.). Texas, on *P. halepensis*.

DAMPING OFF (*Pythium* sp.). Texas.

SEEDLING BLIGHT (*Rhizina inflata*). Maryland, on *P. resinosa* and *P. glauca*.

DAMPING OFF (*Rhizoctonia* sp.). Texas.

LEAF SPOT (*Septoria acicola*). Kentucky, Texas, and Ohio.

TIP BLIGHT (*Sphaeropsis ellisii*). Virginia and New York on *P. montana*; New York, Oklahoma, Pennsylvania, Maryland and Virginia on *P. nigra*; Pennsylvania on *P. resinosa*; New York on *P. sylvestris*; New Jersey.

Thelephora terrestris. Georgia, sporophores found growing around the crown of young seedlings, apparently little damage.

WITCHES BROOM (undetermined). Connecticut on *P. resinosa*.

WINTER INJURY. Georgia, on *P. taeda*, in seed beds in Clark County seedlings from south Georgia seed were badly injured in tops while those from north Georgia were not.

PLATANUS spp. SYCAMORE

TRUNK CANKER (*Ceratostomella* sp.). Pennsylvania.

LEAF SPOT (*Cladosporium* sp.). Texas.

ANTHRACNOSE (*Gnomonia veneta*). This disease was generally prevalent through the eastern United States in more than the usual severity. It was reported from Massachusetts; New Jersey, on *P. occidentalis* and on *P. orientalis* which is not usually infected; Pennsylvania; Delaware; Maryland; District of Columbia; Virginia; West Virginia; Tennessee; Arkansas; Ohio; Indiana; Michigan; Iowa; Missouri; Kansas; and California.

LEAF SPOT (*Pleospora* sp.). Texas.

POPULUS. POPLAR

ROOT ROT (*Armillaria mellea*). Texas.

CANKER (*Cytospora chrysosperma*). Massachusetts, on *P. alba bolleana*, *P. nigra italica*, *P. deltoides*, *P. grandidentata*, and *P. tremuloides*; Texas; Iowa, on *P. dentata*, more prevalent than usual, 5 percent.

TWIG BLIGHT (*Diplodia* sp.). Texas.

CANKER (*Dothichiza populea*). Massachusetts, more active and still the most serious enemy of our Turkestan (*P. alba bolleana*) and Italian (*P. nigra italica*) poplars; New Jersey, on *P. nigra*; Wisconsin.

CANKER (*Hypoxylon pruinatum*). Massachusetts.

ANTHRACNOSE (*Marssonia* sp.). Delaware.

RUST (*Melampsora* sp.). Massachusetts, trees in one stand partially defoliated; Connecticut, *M. abietis-canadensis*; Texas, *M. medusae*; Wisconsin, came so late in the season that there was not much apparent damage; Iowa, *M. medusae* on *P. deltoides*.

NECTRIA CANKER (*Nectria* sp.). See P.D.R. 19:16-17.

LEAF SPOT (*Phyllosticta alcides*). Alabama, on *P. carolinensis* (*P. deltoides virginiana* ?).

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

LEAF SPOT (*Septoria* sp.). California.

LEAF SPOT (*Septoria populicola*). Illinois and Indiana.

YELLOW LEAF BLISTER (*Taphrina aurea*). West Virginia, on *P. nigra italica*.

CROWN GALL (*Bacterium tumefaciens*). Texas.

P R O S O P I S   G L A N D U L O S A

LEAF SPOT (*Gloeosporium* sp.). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

RUST (*Ravenelia arizonica*). Texas.

MISTLETOE (*Phoradendron flavescens*). Texas.

P R U N U S   G L A N D U L O S A.   F L O W E R I N G   A L M O N D

BROWN ROT (*Sclerotinia fructicola*). Kentucky, on *P. glandulosa*, caused die back.

P R U N U S   spp.   W I L D   C H E R R Y,   W I L D   P L U M

LEAF SPOT (*Coccomyces hiemalis*). Maine on *P. pennsylvanica*.

LEAF SPOT (*Phyllosticta virginica*). Maine, on *P. pennsylvanica*, North Dakota on *P. melanocarpa*.

BLACK KNOT (*Plowrightia morbosa*). North and South Dakota, on *P. melanocarpa*.

WILT (*Sclerotinia demissa*). Washington, on *P. demissa*.

PLUM POCKETS and LEAF CURL (*Taphrina* spp.). Nebraska on *P. besseyi*.

BLIGHT (*Bacillus amylovorus*). Wyoming, on *P. melanocarpa*.

P S E U D O T S U G A   T A X I F O L I A.   D O U G L A S   F I R

CANKER (*Cytospora* sp.). Oregon.

LEAF CAST (*Rhabdocline pseudotsugae*). Rhode Island.

TIP BLIGHT (*Sphaeropsis ellisii*). New York.

QUERCUS spp. OAKS

STEM BLIGHT (Aleurodiscus acerinus). Texas, on Q. virginiana, 3 percent.

ROOT ROT (Armillaria mellea). Massachusetts, Wisconsin. See also P.D.R. 19:94-97.

CROWN ROT (Corticium sp.). Texas, on Q. virginiana.

ROT (Daedalea quercina). Massachusetts, common cause of decay. See P.D.R. 19:95.

TWIG BLIGHT (Diplodia longispora). New Jersey, "On Q. prinus, due to drought and cankerworm defoliation trees so weakened that this disease has become serious, killing entire trees. The fungus becomes systemic under these conditions"; Maryland; Texas, on Q. alba; Wisconsin; California.

LEAF SPOT (Discosia artoceras). Texas.

WHITE STREAKED ROT (Fomes applanatus). Massachusetts, common.

WHITE SAPWOOD ROT (Fomes fomentarius). Massachusetts, common cause of rot.

WHITE HEART ROT (Fomes igniarius). Massachusetts, common.

ANTHRACNOSE (Gnomonia veneta) on Q. alba: Massachusetts, more injurious than in most years, white oaks often partially defoliated; Connecticut; Maryland; District of Columbia; New Jersey; North Carolina; Illinois; Michigan, first severe outbreak since 1930, some trees defoliated; Wisconsin, widespread but not as serious as in many previous years, more than in 1934; Minnesota, much more prevalent than usual; Iowa. On Q. kelloggii, Oregon.

WET HEARTWOOD ROT (Hydnum erinaceus). See P.D.R. 19:95.

LEAF SPOT (Hypoderma ilicinum). Texas, on Q. marilandica. Specimens were submitted from Texas for determination. Apparently this is the first report from the State. It was previously collected in Florida in 1887 and about 1890. There are no other specimens in the Mycological Collections of the Division of Mycology and Disease Survey.

LEAF SPOT (Leptothyrium dryinum). Kansas, on Q. imbricaria, first report from the State.

LEAF SPOT (Marssonia martini). Mississippi; Kansas, on Q. muhlenbergii, more prevalent than usual.

POWDERY MILDEW (*Microsphaera quercina*). Iowa, on *Q. alba*, less than usual.

LEAF SPOT (*Morenoella quercina*). Texas, on *Q. stellata*.

NECTRIA CANKER (*Nectria* sp.). See P.D.R. 19:16-17.

ROT (*Nummularia punctulata*). Mississippi, on *Q. nigra*.

POWDERY MILDEW (*Phyllactinia corylea*). New Jersey.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, on pin oak (*Q. durandii* ?), bur oak (*Q. macrocarpa*), willow oak (*Q. phellos*), and live oak (*Q. virginiana*).

ROT (*Polyporus* spp.). See P.D.R. 19:95 and 266.

TAR SPOT (*Rhytisma* sp.). Texas, on *Q. virginiana*.

ROT (*Stereum* spp.). See P.D.R. 19:95 and 266.

CANKER (*Strumella coryneoidea*). Massachusetts. See also P.D. R. 19:16-17 and 266.

LEAF BLISTER (*Taphrina coerulescens*). Massachusetts, New Jersey, Virginia, Tennessee, North Carolina, South Carolina, Texas, Arkansas, and Iowa.

STEM BLIGHT (*Trabutia erythrospora*). Texas on *Q. virginiana*.

ROBINIA PSEUDOACACIA. BLACK LOCUST

SEEDLING ROOT ROT (*Fusarium* spp.). Georgia, in U. S. Soil Conservation nurseries near Athens, loss 10 to 40 percent.

LEAF SPOT (*Macrosporium* sp.). Georgia, in nursery beds at Athens, 40 to 70 percent of the leaves showed spotting in August, defoliation of nearly all the lower leaves.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, 15 percent loss.

WOOD DECAY (*Polyporus robiniophilus*). District of Columbia.

CHLOROSIS (excess lime). Texas, 20 percent injury.

SALIX spp. WILLOW

CANKER (*Cytospora chrysosperma*). Massachusetts, on *S. fragilis*; New Jersey, on *S. alba*; Wisconsin.

HEART ROT (*Daedalea confragrosa*). Massachusetts, on *S. amygdaloides* and *S. fragilis*.

CANKER (*Dothiorella ribis*). Mississippi, on *S. discolor*.

SCAB (*Fusicladium saliciperdum*). New Hampshire, "Very general, willows along the Androscoggin Valley were very generally affected; prevalent on *S. alba*; *S. elegantissima* very susceptible"; Massachusetts, "More injurious than in most past seasons. Not all species are severely injured. Ornamental varieties of golden, weeping, and crack willows appear to be most susceptible. *S. blanda* was the most susceptible species observed."

ANTHRACNOSE (*Gloeosporium salicis*). Massachusetts, "Prevalent and often associated with scab; the same species are susceptible."

STEM BLIGHT (*Macrophoma* sp.). Texas.

TWIG BLIGHT (*Marssonia* sp.). Massachusetts, *M. populi* on native willows and *S. fragilis*; *M. salicis* more prevalent than usual.

RUST (*Melampsora* sp.). Connecticut; *M. bigelowii*, Texas and Iowa.

CANKER (*Phomopsis* sp.). Massachusetts.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, on *S. babylonica* and *S. discolor*.

TWIG CANKER (*Physalospora gregaria* /*Diplodina salicicola*/). West Virginia.

STEM BLIGHT (*Sphaeropsis salicis*). Texas.

SILVER LEAF (*Stereum purpureum*). Washington.

POWDERY MILDEW (*Uncinula salicis*). Massachusetts and Iowa.

TWIG CANKER (*Valsa leucostoma*). Massachusetts.

CROWN GALL (*Bacterium tumefaciens*) on *S. babylonica*, New Jersey, Texas.

S C H I N U S   M O L L E.   P E P P E R   T R E E

ROOT KNOT (*Heterodera marioni*). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

S O R B U S sp. M O U N T A I N A S H

TWIG BLIGHT (*Sphaeropsis* sp.). Massachusetts, probably following winter injury.

BLIGHT (*Bacillus amylovorus*). New Jersey, on *S. americana*.

T A X U S sp. Y E W

BASAL CANKER (*Phomopsis* sp.). New Jersey, on *T. hicksi*.

T I L I A sp. B A S S W O O D

ANTHRACNOSE (*Gloeosporium tiliae*). Massachusetts.

CANKER (*Nectria* sp.). Massachusetts, *N. ditissima*, not prevalent but can be found with little effort. See also P.D.R. 19:16-17.

BROWN MOTTLED ROT (*Pholiota adiposa*). Massachusetts.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, on *T. americana*.

ROT (*Ustulina vulgaris*). New York, on *T. americana*.

T S U G A sp. H E M L O C K

RUST (*Melampsora abietis-canadensis*). Massachusetts and Connecticut.

RUST (*Pucciniastrum myrtilli*). Connecticut.

U L M U S sp. E L M

DIE-BACK (*Cephalosporium* sp.). Massachusetts, more injurious than in most past seasons; Connecticut, in studies of stem injuries of elms Dr. F. A. McCormick isolated this fungus 133 times in pure culture; New Jersey, *C. ulmi* on *U. americana*.

CEPHALOSPORIUM DIEBACK OF ELMS: *Cephalosporium* sp. was isolated from 48.7 percent of the 37,954 specimens suspected of having the Dutch elm disease and submitted to the Dutch elm disease laboratory, Morristown, New Jersey, for culturing in 1935. No changes in the distribution have been made since that reported by Verrall in P. D. R. Supplement 90. A pycnidial stage of the fungus has been recognized and has temporarily been assigned to the genus *Dothiorella*. Pycnidia occur in cankers on twigs and branches of affected trees. It is difficult to recognize the pycnidia by observation alone as certain other fungi found on cankered elm resemble them closely. (A. F. Verrall, Emergency Conservation Work, Division of Forest Pathology).

DUTCH ELM DISEASE. During 1935 Ceratostomella ulmi was isolated from only 17.2 percent of all the specimens received at the Dutch elm disease laboratory, Morristown, New Jersey, as compared with 40.9 percent in 1934.

Transmission of the fungus from tree to tree through grafted roots was found to be an important factor in the spread of the disease in woods and swamps where elms are abundant. Grafts were generally present between trees of 8" or more D.B.H. standing 7 feet or less apart. Grafts were found between trees 17 feet apart. Several cases of three and four trees grafted into a common system were found. No grafts were found between elm and other species but very tight mechanical contacts were frequently observed. (Phytopath. 25:1039-1040, 1935).

Inoculation tests offered further evidence that an injury through the bark is necessary for infection by C. ulmi. Numerous attempts to inoculate trees by spraying a spore suspension on uninjured bark of the trunk and twigs of small trees and on leaves gave negative results. However, when the fungus was placed in contact with the cambium region or on exposed sapwood just beneath the bark, infection took place readily.

Spores of the fungus were passed through a 28-foot length of elm trunk in 55 minutes in one case and in slightly less than 2 hours in another. The trunks were elevated slightly above the ground and spores were introduced in suspension in quantity at the top. The drip at the bottom was collected on agar plates. Colonies of C. ulmi developed on the plates exposed 55 minutes and 2 hours, respectively, after flow had started from the lower end. These preliminary experiments suggest a possible means of rapid distribution of the fungus in the tree.

Study of the occurrence and survival of C. ulmi in dead wood was continued. C. ulmi was isolated from a single dead branch from one tree in Connecticut and from dead wood alone from numerous trees in New Jersey. In these cases the fungus had apparently been introduced after the death of the part in question and was growing in the wood saprophytically. However, preliminary investigations indicate that in nature the fungus may not survive indefinitely as a saprophyte in competition with other organisms.

A beginning was made on a study of the host range of C. ulmi. Altogether 30 species of trees were inoculated. The trees, inoculated in the fall, were cut and examined the following summer. No symptoms of wilting or yellowing of the leaves developed on any of the inoculated trees. Included in the experiment were members of the genera Acer, Quercus, Betula, Celtis, Populus, Robinia, and Tilia.

An investigation of the disease in England was begun in cooperation with Oxford University where headquarters for the work were established. Dr. J. M. Walter is in charge of the pathological investigations of the laboratory there. Preliminary observations on the distribution of the disease in England, its means of spread, and severity were made. Plots were established in which it is proposed to make an annual comparative study of the progress of the disease on individual English and American elms. A study of possible control measures such as pruning and fertilization is contemplated. A number of problems that cannot well be investigated in this country at the present are being investigated. A search is being made for additional possible sources by which diseased material might be brought into the United States. (Curtis May, Division of Forest Pathology).

LEAF SPOT (*Cercospora sphaeriaeformis*). Texas.

LEAF SPOT (*Cladosporium* sp.). Texas.

CANKER (*Coniothyrium* sp.). Illinois. See P.D.R. 19:14-16.

LEAF SPOT (*Coniothyrium ulmi*). Nebraska, on *U. americana*.

CANKER (*Cytospora* sp.). Pennsylvania, on *U. americana*; Massachusetts, *C. carbonacea* on *Ulmus* spp.; Illinois, *C. ludibunda* on *U. americana*.

LEAF SPOT (*Didymosphaeria* sp.). Texas, on *U. parvifolia*.

CANKER (*Diplodia* sp.). Texas, *D. ulmi* Dearness ? on *U. crassifolia*.

WILT (*Fusarium* sp.). Massachusetts and Connecticut.

ANTHRACNOSE (*Gloeosporium* sp.). Connecticut, *G. ulmicolum* on *U. pumila*; Texas, on *U. americana* and *U. parvifolia*.

BLACK LEAF SPOT (*Gnomonia ulmea*) on *U. americana*: Vermont; New Hampshire; Massachusetts, "Less damaging than usual"; Connecticut, "One report as compared with 33 in 1934"; Maryland; Virginia; District of Columbia; Kentucky; North Carolina; Georgia; Alabama; Mississippi; Texas, "On *U. americana*, *U. parvifolia*, and *U. pumila*"; Michigan, "Appeared later than usual and did not reach the usual intensity"; Minnesota; Iowa.

LEAF SPOT (*Hormodendron* sp.). Texas, on *U. americana*.

LEAF SPOT (*Macrosporium* sp.). Texas, on *U. americana*.

CANKER (*Nectria* sp.). Massachusetts; Texas, *N. cinnabarina* on *U. parvifolia*.

CANKER (*Phoma* sp.). Illinois.

CANKER (*Phomopsis oblonga*). Massachusetts on *U. americana* and *U. glabra camperdowni*; South Carolina on *U. americana*.

CANKER (*Phomopsis* sp.). New Jersey, on *U. americana*.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, on *U. americana* and *U. parvifolia*.

WHITE SAP ROT (*Pleurotus ulmarius*). Massachusetts.

TWIG ROT (*Polyporus conchifer*). Massachusetts.

LEAF SPOT (*Sacidum ulmifoliae*). Texas, on *U. parvifolia*.

LEAF SPOT (*Septobasidium* sp.). Texas, on *U. crassifolia*.

CANKER (*Sphaeropsis* sp.) on *U. americana*. Massachusetts, "More injurious than in most seasons, causes a twig die-back"; Connecticut; Mississippi; Wisconsin.

WILT (*Verticillium* sp.). Massachusetts; Connecticut; found 22 times out of 400 cultures made from elms by Dr. McCormick; West Virginia; Ohio.

ELM WILT CAUSED BY VERTICILLIUM: During 1935 *Verticillium* sp. was isolated at the Dutch elm disease laboratory, Morristown, New Jersey, from 3.8 percent of the 37,954 samples suspected of being affected with the Dutch elm disease. No changes in the distribution have been made since that reported in P. D. R. Supplement 90, December 31, 1935, with the exception of five cases isolated from specimens of *Ulmus* sp. sent in by scouts in Louisiana. It is interesting to note that despite the increase in specimens collected and cultured each year the percentage of trees infected with *Verticillium* remains fairly constant at about 4 percent. (E. G. Kelsheimer, Emergency Conservation Work, Division of Forest Pathology).

MEADOW NEMATODE (*Anguillulina pratensis*). Oklahoma, on *U. parvifolia*, a new host for this parasite.

MOSAIC (virus ?). Connecticut.

DISEASES OF ORNAMENTAL AND MISCELLANEOUS PLANTS

ABUTILON

RUST (*Uromyces spermacoces*). Texas.

MOSAIC (virus). Kansas, on *A. theophrasti*, first time noted in the State.

AGAVE LECHEGUILLA

LEAF SPOT (*Exosporium* sp.). Texas.

ALTERNANTHERA PHYLLOXEROIDES

NEMATODE (*Anguillulina dihystera*). Louisiana.

ROOT KNOT (*Heterodera marioni*). Louisiana.

ALTHAEA ROSEA

LEAF SPOT (*Cercospora althaeina*). Connecticut, Texas, Michigan, Iowa.

POWDERY MILDEW (*Erysiphe polygoni*). Iowa.

RUST (*Puccinia heterospora*). Texas.

RUST (*Puccinia malvacearum*). New Hampshire; Connecticut; New Jersey; Pennsylvania; Virginia, unusually destructive; Tennessee, "Found in three counties in east Tennessee, does not occur in this State frequently"; Michigan, "This is the first season in years that rust has not been one of the most common diseases of ornamental plants. Conditions apparently were much more favorable than usual for rust but it failed to develop"; Wisconsin, more than last year, less than usual; Iowa, less than in average years or in 1934; Washington.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

LEAF SPOT (*Septoria fairmani*). Michigan and Minnesota.

ROOT KNOT (*Heterodera marioni*). Texas.

A M A R A N T H U S sp.

MOSAIC (virus). Kansas, "Several plants in a cucumber field were affected with mottled, shoe-string leaves, dwarfed."

A M E L A N C H I E R sp.

WITCHES BROOM (Apiosporium collinsii). North Dakota.

RUST (Gymnosporangium sp.). Massachusetts; North Carolina, G. clavipes on A. canadensis.

LEAF SPOT (Phyllosticta innumerabilis). North Dakota.

A M P E L O P S I S sp.

LEAF SPOT (Guignardia bidwellii). New Jersey, on A. veitchii; Delaware, very severe; District of Columbia; Texas; Michigan; Wisconsin.

LEAF SPOT (Phyllosticta labruscae). Mississippi.

Tubercularia nigricans. Texas, on A. aconitifolia.

A N E M O N E C O R O N A T A

RUST (Tranzschelia pruni-spinosae). California, in commercial planting, San Jose.

A N G E L I C A A M P L A

STEM BLIGHT (Heterosporium sp.). Wyoming.

A N O D A L A V A T E R O I D E S

RUST (Puccinia heterospora). New Mexico, collected at State College, apparently a new record for this host in the United States.

A N T I R R H I N U M M A J U S

ANTHRACNOSE (Colletotrichum antirrhini). New Jersey.

COLLAR ROT (Corticium vagum). Texas.

CROWN ROT (Myrothecium roridum). Texas.

DIE BACK (Phoma sp. undetermined). Michigan, "A very troublesome disease in breeding stocks. Cankers form on the smaller branches and the plants die back. Unless checked by spraying or dry weather the entire plant is killed."

LEAF SPOT (Phyllosticta antirrhini). New Jersey.

ROOT ROT (Phymatotrichum omnivorum). Texas.

WILT (Phytophthora sp.). Minnesota, very serious in some gardens around Winona and St. Paul.

RUST (Puccinia antirrhini). Massachusetts; Connecticut, "One report shows III stage, unusual here"; New Jersey; Virginia, unusually destructive; Texas; Michigan, "Out-of-door plantings less seriously affected than usual due to dry weather from mid-summer to October. The most important disease of this plant in gardens and nearly always destructive in late summer"; Wisconsin; Minnesota; Iowa; North Dakota, more than usual; Kansas.

WILT, STEM ROT (Sclerotinia sclerotiorum). Texas; Michigan, "Common in greenhouses in January and February, in some instances the cause of important losses. Dull weather, crowding, and improper regulation of moisture important factors in outbreaks"; California.

STEM ROT (Sclerotium rolfsii). Texas.

WILT (Verticillium dahliae). New Jersey.

ROOT KNOT (Heterodera marioni). Texas.

MOSAIC (virus). Kansas, "Mottling slight, plants stunted, internodes shortened, leaves small in size. Occurred in a cucumber field, several infected plants noted."

A Q U I L E G I A sp.

ROT (Botrytis cinerea). Virginia.

POWDERY MILDEW (Erysiphe polygoni). California.

CROWN ROT (Sclerotinia sp.). Virginia.

CROWN ROT (Sclerotium delphinii). New Jersey on A. vulgaris.

MOSAIC (virus). Kansas.

A R N I C A C O R D I F O L I A

LEAF SPOT (Phyllosticta arnicae). Wyoming.

A R T E M I S I A   C A N A

RUST (Puccinia absinthii). Wyoming.

A S P A R A G U S   spp.

BLIGHT (Ascochytula asparagina). Texas, on A. plumosus.

LEAF SPOT and CANKER (Fusarium sp.). New Jersey, on A. asparagoides.

A S T E R   sp.

ROOT ROT (Phymatotrichum omnivorum). Texas, on purple aster.

A S T I L B E   A R E N D S I I

POWDERY MILDEW (cuase not named). Massachusetts, sulphur dust controls it, some plants entirely defoliated in mid-summer.

A U C U B A   J A P O N I C A   A U R E A

SPOT (Colletotrichum pollaccii). New Jersey.

A Z A L E A

LEAF GALL (Exobasidium vaccinii). Mississippi and California.

STEM BLIGHT (Phomopsis sp.). Massachusetts.

LEAF SPOT (Septoria sp.). New Jersey, S. azaleae on Azalea spp., particularly certain indica varieties and A. hinodegiri; California, on A. occidentalis.

BUD and TWIG BLIGHT (Sporocybe azaleae). Massachusetts, "Bud blight has killed 75 percent of native azalea buds. The situation is alarming. It sometimes kills the whole plant"; Georgia, "Ten to 20 percent of the buds destroyed on native plants."

BARK BLIGHT (Trichothecium lignorum). Massachusetts, constantly isolated from dead azalea stems and seems to be a parasite.

WILT (Verticillium albo-atrum). Massachusetts, often observed.

B E G O N I A   sp.

ANTHRACNOSE (Gloeosporium sp.). Texas.

CROWN ROT (Rhizoctonia sp.). Texas.

BACTERIAL LEAF SPOT. New Jersey.

BACTERIUM FLAVOZONATUM, n. sp. ON BEGONIA: A bacterial disease, causing definite, circular spots on the leaves of begonia has been reported a number of times during the past 20 years from various parts of the United States. Apparently all begonias are more or less susceptible and in some cases the damage is considerable. Recently the causal organism has been studied and named Bacterium flavozonatum. (Lucia McCulloch, Division of Fruit and Vegetable Crops and Diseases).

ROOT KNOT (Heterodera marioni). Texas.

BERBERIS THUNBERGII

FRUIT ROT and TWIG BLIGHT (Phoma berberina). Massachusetts, cultured from dead twigs and common in rotted berries in autumn.

WILT (Verticillium sp.). Massachusetts, sometimes cultured from stems of wilted and dead plants; New Jersey, V. dahliae.

WINTER INJURY (non-parasitic). Connecticut.

BOERHAAVIA ERECTA

WHITE RUST (Albugo platensis). Texas.

BROUSSONETIA PAPYRIFERA

ROOT ROT (Phymatotrichum omnivorum). Texas.

BUMELIA sp.

LEAF SPOT (Phyllosticta bumeliifolia). Texas.

BUXUS SEMPERVIRENS

LEAF SPOT (Macrophoma candollei). New Jersey, on var. suffruticosa following winter injury and canker; Ohio.

CANKER (Volutella buxi). New Jersey, severe on winter injured boxwood all over the State.

CALENDULA OFFICINALIS

BLIGHT (Botrytis sp.). New Jersey.

SMUT (Entyloma calendulae). Oregon.

DROP (*Sclerotinia sclerotiorum*). Louisiana and Texas.

STEM ROT (*Sclerotium rolfsii*). Texas.

YELLOWS (virus). Connecticut.

C A L L I S T E P H U S   C H I N E N S I S

STEM BLIGHT (*Botrytis* sp.). New Jersey, "Particularly severe on wilt resistant varieties under cloth."

RUST (*Coleosporium solidaginis*). Massachusetts; New Jersey; Wisconsin, more prevalent than usual.

WILT (*Fusarium conglutinans callistephi*). New Jersey, "Scattered distribution on greenhouse grown plants"; Pennsylvania, general, 15 percent loss; Arkansas, rather common; Ohio; Michigan; Wisconsin; North Dakota; Washington; Oregon; California.

STEM CANKER (*Phomopsis callistephi*). Wisconsin.

ROOT ROT (*Phytophthora cryptogea*). California.

SPOTTED WILT (virus). California.

YELLOWS (virus). Massachusetts, "More asters survived the yellows than in the past ten years. Generally there is about 90 percent loss, this year only about 10 percent. Dry seasons for two summers in succession"; New Jersey, general; Connecticut; Pennsylvania, usual amount, 10 percent; Arkansas; Ohio; Michigan, "Much less prevalent than usual due apparently to conditions which were not favorable for vectors"; Wisconsin; Kansas; Washington; California.

C A M E L L I A   J A P O N I C A

LEAF SPOT (*Colletotrichum* sp.). Mississippi.

GALL (*Exobasidium camelliae*). Mississippi.

LEAF SPOT (*Pestalozzia guepini*). Mississippi.

WINTER SUN SCALD (non-parasitic). Mississippi, considerable winter sun scald and cold injury occurred this year.

C A N N A   I N D I C A

LEAF SPOT (*Alternaria* sp.). Texas.

BUD ROT (*Bacterium cannae*). New Jersey.

C A R E X sp.

RUST (*Puccinia* sp.). Missouri, *P. extensicola* on *C. pennsylvanica*; Montana, *P. caricis urticata* on *C. rostrata*.

C A S S I A sp.

LEAF SPOT (*Alternaria* sp.). Puerto Rico, first record.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, on *C. artemisioides*.

ROOT KNOT (*Heterodera marioni*). Texas, on *C. artemisioides*; Hawaii, on *C. occidentalis*.

C E A N O T H U S sp.

CROWN GALL (*Bacterium tumefaciens*). Washington.

C E N T A U R E A C Y A N U S

CROWN ROT (*Rhizoctonia* sp.). Texas.

C E P H A L A N T H U S O C C I D E N T A L I S

LEAF SPOT (*Alternaria* sp.). Texas.

LEAF SPOT (*Cladosporium* sp.). Texas.

C H R Y S A N T H E M U M F R U T E S C E N S

WILT (*Verticillium dahliae*). New Jersey.

C H R Y S A N T H E M U M H O R T O R U M

TIP BLIGHT (*Botrytis* sp.). Washington.

LEAF SPOT (*Cercospora chrysanthemi*). Texas.

STEM ROT (*Corticium vagum*). Texas.

POWDERY MILDEW (*Erysiphe cichoracearum*). New Jersey and Pennsylvania.

RUST (*Puccinia chrysanthemi*). Pennsylvania and Washington.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

LEAF SPOT (Septoria chrysanthemella). New Jersey, particularly on greenhouse forcing varieties; Pennsylvania; District of Columbia; Texas; Washington.

LEAF SPOT (Septoria obesa ?). New Jersey, severe on variety plantings on the College Farm, New Brunswick.

WILT (Verticillium dahliae). New Jersey and Washington.

CROWN GALL (Bacterium tumefaciens). New Jersey and Texas.

FASCIATION (Bacterial). New Jersey.

LEAF NEMATODE (Aphelenchoides fragariae). Connecticut.

C I M I C I F U G A   F O E T I D A   S I M P L E X

ROOT KNOT (Heterodera marioni). New Jersey.

CINERARIA sp. See SENECIO CRUENTUS

C I T R U S sp.

ANTHRACNOSE (Colletotrichum gloeosporioides). New Jersey, on C. taitensis.

BLACK ROT (Physalospora obtusa). Alabama, on C. trifoliata.

C L A R K I A sp.

DAMPING OFF (Rhizoctonia solani). Connecticut, new host for State.

C O L E U S sp.

WILT (Verticillium sp.). Connecticut, new to State, causing death of plants.

C O N V A L L A R I A   M A J A L I S

LEAF SPOT (Phyllosticta sp.). New Jersey.

C O R D Y L I N E   T E R M I N A L I S

LEAF SPOT (Phyllosticta maculicola). New Jersey.

C Y D O N I A   J A P O N I C A

TWIG BLIGHT (*Dothiorella ribis*). Texas.

CANKER (*Nectria cinnabarina*). New Hampshire.

TWIG BLIGHT (*Phoma* sp.). Texas.

BLACK ROT (*Physalospora obtusa*). Texas.

BROWN ROT (*Sclerotinia fructicola*). California.

CROWN GALL (*Bacterium tumefaciens*). Connecticut, first report for state on this host.

ROOT KNOT (*Heterodera marioni*). Texas.

WINTER INJURY (non-parasitic). Connecticut.

D A H L I A   sp.

POWDERY MILDEW (*Erysiphe cichoracearum*). Connecticut.

POWDERY MILDEW (*Erysiphe polygoni*). New Jersey.

LEAF SPOT (*Macrosporium* sp.). Michigan.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

BACTERIAL ROT (undetermined). Washington.

LEAF NEMATODE (*Aphelenchoides fragariae*). California, first observation on this host in United States.

MOSAIC (virus). New Jersey; Michigan, "An important disease in most commercial plantings. Symptoms vary with varieties and include dwarfing, mottling, and proliferation of axillary buds. Some commercial stocks are very generally infected"; Wisconsin; Washington.

RING SPOT (virus). Michigan, "Appeared generally in most varieties in the American Dahlia Society test garden at East Lansing. Symptoms were conspicuous in July and August but were masked later. No dwarfing effect was noted."

D E L P H I N I U M   sp.

BLIGHT (*Botrytis* sp.). Massachusetts, 5 percent loss due to *B. cinerea*; Mississippi; Wisconsin.

POWDERY MILDEW (*Erysiphe cichoracearum*). Massachusetts, "Most seen in years. Injury from defoliation, 50 percent."

POWDERY MILDEW (*Erysiphe polygoni*). Pennsylvania, more than usual; California.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

CROWN ROT (*Sclerotium delphinii*). Connecticut, New Jersey, Pennsylvania, Virginia, Mississippi, Arkansas, and Kansas.

STEM ROT (*Sclerotium rolfsii*). Texas.

BLACK SPOT (*Bacterium delphinii*). Massachusetts, trace, least seen in years; New Jersey; Pennsylvania; Virginia, more than usual; Wisconsin, less prevalent than in an average year.

MOSAIC (virus). Pennsylvania.

STUNT (virus). Washington.

DIANTHUS CARYOPHYLLUS

LEAF SPOT (*Alternaria dianthi*). Massachusetts, nearly every greenhouse has it; Connecticut; New Jersey; Pennsylvania; Texas.

BUD BLIGHT (*Botrytis cinerea*). Massachusetts.

WILT (*Fusarium* sp.). Massachusetts, "Widespread and source of considerable trouble to even the best of growers"; New Jersey; Washington.

STEM ROT (*Rhizoctonia solani*). Massachusetts, Texas, and Kansas.

RUST (*Uromyces caryophyllinus*). Massachusetts, New Jersey, Pennsylvania, Iowa, and Washington.

BACTERIAL SPOT (*Bacterium woodsii*). Massachusetts, on English varieties, Waltham field station.

DIANTHUS sp.

LEAF SPOT (*Alternaria dianthi*). Minnesota, "Only one report of an exceedingly heavy infection on a perennial species after a heavy winter covering with cane."

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

RUST (*Uromyces caryophyllinus*). Texas.

D I E F F E N B A C H I A sp.

ANTHRACNOSE (*Colletotrichum* sp.). New Jersey.

D R A C A E N A F R A G R A N S

LEAF SPOT (*Gloeosporium* sp.). Louisiana. Puerto Rico also reported a leaf spot of undetermined cause.

E R Y T H R I N A A R B O R E A

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

E U O N Y M U S sp.

LEAF SPOT (*Exosporium concentricum*). Texas.

ANTHRACNOSE (*Glomerella cingulata*). Texas.

POWDERY MILDEW (*Oidium* sp.). Texas.

LEAF SPOT (*Pestalozzia funerea*). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

POWDERY MILDEW (undetermined). California.

E U P H O R B I A sp.

LEAF BLIGHT (*Botrytis* sp.). New Jersey, on *E. marginata*.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, on *E. marginata*.

ROOT KNOT (*Heterodera marioni*). Hawaii, on *E. preslii*.

F I C U S sp.

ANTHRACNOSE (*Gloeosporium cingulatum*). New Jersey, on *F. elastica* and *F. pandurata*.

F O R S Y T H I A sp.

LEAF SPOT (Bacterial). Delaware.

WINTER INJURY (non-parasitic). Massachusetts, "Very few shrubs in the Connecticut Valley bore blossoms, buds winter killed save those under snow."

FREESIA sp.

CORM ROT (*Fusarium* sp.). New Jersey.

SCAB (*Bacterium marginatum*). Washington.

GARDENIA FLORIDA

SOOTY MOLD (*Capnodium* sp., *Fumago* sp.). Texas, common.

CANKER (*Phomopsis* sp.). Nebraska, California. (P.D.R. 20:128).

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

STEM ROT (undetermined). Puerto Rico, a dry stem rot.

ROOT KNOT (*Heterodera marioni*). Kentucky.

CHLOROSIA (excess lime). Texas.

GLADIOLUS sp.

ROT (*Fusarium* sp.). Massachusetts, Pennsylvania, Texas, Wisconsin, and Kansas.

ROT (*Penicillium gladioli*). Massachusetts, New Jersey, Pennsylvania, Texas, and Wisconsin.

DRY ROT (*Sclerotinia gladioli*). Texas; Michigan, "During the past five years the amount of this disease in commercial stock has greatly decreased. No longer found in most varieties in any but negligible amounts. More this season than for several years due to greater rainfall"; Minnesota, "More prevalent than at any time during the past ten years."

HARD ROT (*Septoria gladioli*). New Jersey, Pennsylvania, and Wisconsin.

CORM ROTS (various fungi). Michigan, "Unusually large number of complaints of corm decay in storage, core rot common in many varieties."

BACTERIAL LEAF SPOT (*Bacterium gummisudans*). Wisconsin.

SCAB (*Bacterium marginatum*). Massachusetts, less prevalent than usual; New Jersey; Pennsylvania; Texas; Ohio; Michigan, "Dry weather from mid-summer to harvest made soil conditions rather unfavorable for infection of new corms"; Kansas, not serious this year; Washington.

MOSAIC (virus). Massachusetts, in one greenhouse only; Pennsylvania.

G Y P S O P H I L A sp.

DAMPING OFF (Pythium debaryanum). Connecticut on G. alba.

DAMPING OFF (Rhizoctonia solani). Connecticut, on G. alba.

WILT and ROT (Fusarium sp.). Connecticut.

GALL (Bacterium gypsophilae). New Jersey, "On young grafted plants of G. paniculata, received from Massachusetts, typical of gall described by Nellie A. Brown."

H E D E R A H E L I X

LEAF SPOT (Phyllosticta concentrica). New Jersey.

LEAF SPOT (Bacterium hederae). New Jersey.

WINTER INJURY (non-parasitic). Massachusetts.

H E L I A N T H U S sp.

POWDERY MILDEW (Erysiphe cichoracearum). Connecticut, on H. annuus; Wisconsin; Iowa.

ROOT ROT (Phymatotrichum omnivorum). Texas.

DOWNY MILDEW (Plasmopara halstedii). Texas, on miniature ornamental variety.

RUST (Puccinia helianthi). Connecticut, "One report on H. annuus, common on wild species"; Alabama, on H. angustifolius and H. annuus nana; Wisconsin, "More in northern than in central and southern parts of the State"; Iowa; Wyoming; Arizona.

WILT and STEM ROT (Sclerotinia sclerotiorum). Washington.

H E L L E B O R U S N I G E R

FLOWER SPOT (Botrytis sp.). New Jersey.

FLOWER SPOT (Gloeosporium sp.). New Jersey.

H I B I S C U S spp.

LEAF SPOT (Alternaria sp.). New Jersey.

LEAF SPOT (Cercospora sp.). Texas, on H. sabdariffa.

ROOT ROT (*Phymatotrichum omnivorum*). Texas, on *H. sabdariffa* and *H. syriacus*.

ROOT ROT (*Rhizoctonia* sp.). Texas, on *H. sabdariffa*.

H O S T A   S U B C O R D A T A   G R A N D I F L O R A

CROWN ROT (*Sclerotium delphinii*). New Jersey.

H Y A C I N T H U S   O R I E N T A L I S

NEMATODE (*Anguillulina dipsaci*). New Jersey.

H Y M E N O C L E A   M O N O G Y R A

LEAF SPOT (*Macrosporium puccinioides*). Texas.

STEM ROT (*Phoma herbarum*). Texas.

RUST (*Puccinia splendens*). Texas.

I P O M O E A   spp.

RUST (*Coleosporium ipomoeae*). Texas.

WHITE RUST (*Albugo ipomoeae panduranae*). Kansas, on wild species.

ROOT KNOT (*Heterodera marioni*). Hawaii, on *I. pes-caprae*, *I. tuberculata*, and *I. turpethum*.

I R I S   spp.

BLOSSOM BLIGHT (*Botrytis cinerea*). Massachusetts.

CROWN ROT (*Botrytis convoluta*). Minnesota, "Rotting of the leaves at the base of the older leaves of the fans was very abundant during September and October. Conidia found in the fields October 30. Sclerotia found on roots of variety Grace Sturtevant imported from Colorado three weeks after planting. (October 18). Stock received from California and Connecticut also infected according to one grower." (L. Dosdall).

LEAF SPOT (*Cylindrosporium iridis*). Texas.

LEAF SPOT (*Didymellina iridis*). Massachusetts, less damage than usual; Connecticut; New Jersey; Pennsylvania; Tennessee; Mississippi; Texas; Michigan, "Primary infection very heavy due to unusually favorable conditions in the spring, by flowering time the leaves were killed back several inches,

plants weakened and flowers poor in quality"; Wisconsin; Minnesota; Kansas; Wyoming; Washington; Oregon; California, "On the common iris and on I. xiphium and on the sub-genus Onocyclus."

DRY ROT (Fusarium sp.). Texas.

RUST (Puccinia iridis). Connecticut, found this year only on wild species; Texas; California.

STEM ROT (Sclerotium rolfsii). Texas.

SOFT ROT (Bacillus carotovorus). Massachusetts; Connecticut; New Jersey; Pennsylvania; Michigan, much more prevalent than usual; Wisconsin; Minnesota.

BACTERIUM TARDICRESCENS, N. SP. ON BEARDED IRIS: A recent study has shown that a specific bacterium is the cause of a leaf disease of the bearded iris. The disease occurs perhaps rather commonly but may be confused with other iris troubles. Irregular blotches or elongated streaks of dark green, watersoaked tissues develop. These later become yellow to brown, dry and translucent. An extended period of moist weather seems necessary for extensive infection and serious damage to the leaves. Rhizomes are not attacked. (Lucia McCulloch, Division of Fruit and Vegetable Crops and Diseases).

ROOTSTOCK DECAY (Bacterial). Bacterial rootstock decays caused by undetermined species were reported from Kansas and Washington.

BACTERIAL LEAF BLIGHT (undetermined). Massachusetts, "Observed at Amherst and on Cape Cod, some varieties badly damaged, very little rhizome rot."

ROOT KNOT (Heterodera marioni). Alabama, on bearded iris.

MOSAIC (virus). Mississippi, first report from the State.

K A L A N C H O E   G L O B U L I F E R A   C O C C I N E A

STEM ROT (Fusarium sp.). New Jersey.

K A L M I A   L A T I F O L I A

LEAF SPOT (Mycosphaerella colorata). Connecticut, New Jersey, and District of Columbia.

LEAF SPOT (Phomopsis kalmiae). New Jersey.

K E N T I A   F O R S T E R I A N A

ANTHRACNOSE (Gloeosporium palmarum). New Jersey.

K E R R I A   J A P O N I C A

LEAF and TWIG BLIGHT (Cylindrosporium kerriae). Connecticut.

DIE BACK (Phoma sp.). New Jersey.

L A G E R S T R O E M I A   sp.

LEAF SPOT (Cercospora lythracearum). Texas.

POWDERY MILDEW (Oidium sp.). Texas.

ROOT ROT (Phymatotrichum omnivorum). Texas.

L A T H Y R U S   O D O R A T U S

LEAF SPOT (Alternaria sp.). Texas.

BLIGHT (Ascochyta pisi). Louisiana.

BLOSSOM BLIGHT (Botrytis sp.). Washington.

WHITE MOLD (Cladosporium album). Pennsylvania.

STEM ROT (Corticium vagum). New Jersey and Texas.

POWDERY MILDEW (Erysiphe polygoni). Massachusetts and Iowa.

ANTHRACNOSE (Glomerella cingulata). Louisiana.

POWDERY MILDEW (Microsphaera alni). New Jersey.

BLACK ROOT ROT (Thielaviopsis basicola). New Jersey.

STREAK (Bacillus lathyri). Texas and California.

CROWN GALL (Bacterium tumefaciens). Connecticut, "One report in greenhouse, produces cauliflower-like growth at base of plants"; Georgia, "Twenty percent of much enlarged fasciation at crown in plants in one Athens greenhouse."

ROOT KNOT (Heterodera marioni). Texas.

MOSAIC (virus). Kansas, Washington, and California.

LEAF BLIGHT and SPOTTING (Sulphur dioxide injury). Washington.

L E P I D I U M sp.

WHITE RUST (Albugo candida). Iowa.

POWDERY MILDEW (Peronospora parasitica). Iowa.

L E U C O T H O E C A T E S B A E I

LEAF SPOT (Phyllosticta sp.). New Jersey.

L I G U L A R I A K A E M P F E R I

LEAF SPOT (Gloeosporium sp.). Virginia and Iowa.

L I G U S T R U M sp.

LEAF SPOT (Cercospora ligustri). Texas.

DODDER (Cuscuta sp.). Texas.

LEAF SPOT (Exosporium concentricum). Texas.

ANTHRACNOSE (Glomerella cingulata). Pennsylvania, Georgia, and Colorado, on L. ovalifolium; Texas; Kansas.

LIMB BLIGHT (Pestalozzia guepini). Texas.

ROOT ROT (Phymatotrichum omnivorum). Texas.

WINTER INJURY (non-parasitic). Massachusetts, on L. ibota.

L I L I U M sp.

BOTRYTIS BLIGHT (Botrytis sp.). New Jersey, on L. regale; Pennsylvania, on L. candidum, "Much more severe during wet weather"; Virginia, on L. candidum, "Developed in severe form in some places, practically destroyed several plantings"; Michigan, "B. elliptica, serious in many plantings of L. candidum, the most susceptible species. Seedlings of L. regale are very susceptible but old plantings are seldom seriously attacked. Well controlled with copper sprays or dusts when used as directed"; Wisconsin.

STEM ROT (Fusarium sp.). Delaware, on L. auratum, "Definite stem lesions above bulb scales causing stems to collapse from terminals to base."

STEM ROT (*Phytophthora* sp.). Wisconsin.

BULB ROT (*Rhizoctonia bataticola*). California, on *L. philippinensis*, first report on this host.

ROOT and BULB ROTS (various organisms). Massachusetts, "About 80 percent of growers reported that 50 percent of lily bulbs failed to grow flowers, *Bacillus carotovorus*, *Fusarium* sp. and *Rhizoctonia* sp. were found."

ROOT and BULB ROT (unknown). Michigan, "Most florists reported a 30 to 40 percent loss in *L. longiflorum giganteum* from failure of the bulbs to root and from a basal decay. It is my opinion that this was due to improper maturity of bulbs and poor growing conditions in Japan. The trouble is similar to that on tulips when they are not properly cured in Holland." (R. Nelson).

MOSAIC (virus). Wisconsin and Washington.

L O N I C E R A sp.

BARK BLIGHT (*Fusarium* sp.). Massachusetts, on *L. tatarica*.

POWDERY MILDEW (*Microsphaera alni*). Mississippi.

STEM and TWIG BLIGHT (*Phoma mariea*). Massachusetts, on *L. tatarica*.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

L U P I N U S sp.

STEM ROT (*Sclerotium delphinii*). Kansas.

M A H O N I A A Q U I F O L I U M

LEAF SPOT (*Phyllosticta* sp.). New Jersey.

M A T T H I O L A sp.

BLIGHT (*Botrytis cinerea*). Texas.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

FOOT and STEM ROT (*Rhizoctonia* sp.). New Jersey, on *M. incana*; California, *R. solani*.

WILT (*Sclerotinia sclerotiorum*). Michigan, "The cause of considerable damage in greenhouse plantings during December, January, and February. Initial infection occurs through the lower leaves which hang down and touch the soil. The fungus kills back the leaves to the main stem where canker formation results in complete girdling."

WILT (unknown). Michigan, "A wilting of stocks has been prevalent in greenhouse plantings for several years. There is a very characteristic discoloration of the vascular tissues but no parasite has yet been isolated. Prevalent only in certain varieties during dull months of winter."

MERTENSIA CILIATA

POWDERY MILDEW (*Erysiphe cichoracearum*). Wyoming.

MITCHELLA REPENS

STEM ROT (*Sclerotium rolfsii*). Maryland.

MITELLA PENTANDRA

RUST (*Puccinia heucherae*). Wyoming.

NANDINA DOMESTICA

ANTHRACNOSE (*Gloeosporium* sp.). Texas.

NARCISSUS sp.

SMOULDER (*Botrytis narcissicola*). Washington.

BASAL ROT (*Fusarium* sp.). Washington.

LEAF SPOT (*Hendersonia curtisii*). Texas.

RAMULARIA BLIGHT (*Ramularia vallisumbrosae*). Washington.

LEAF SCORCH (*Stagonospora curtisii*). Washington and California.

ROOT ROT (Bacterial). Washington.

MOSAIC (virus). California, particularly King Alfred and Emperor varieties.

NEPETA CATARIA

MOSAIC (virus). Kansas.

N E R I U M   O L E A N D E R.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

GALL (*Bacterium tonellianum*). California.

N O L I N A   M A C R O C A R P A

SMUT (*Tolyposporella nolinae*). Texas.

N O T H O S C O R D I U M   B I V A L V E

RUST (*Uromyces primaveralis*). Texas.

N Y M P H A E A   sp.

LEAF SPOT (*Cercospora nymphaeacea*). Texas.

O P U N T I A   sp.

SCALD (*Hendersonia optuniae*). Texas.

LEAF SPOT (*Phyllosticta* sp.). New Jersey.

O X A L I S   C O R N I C U L A T A

SMUT (*Ustilago oxalidis*). Pennsylvania.

P A C H Y S A N D R A   T E R M I N A L I S

STEM CANKER (*Volutella* sp.). New Jersey.

P A E O N I A   sp.

ROOT ROT (*Armillaria mellea*). California.

BLIGHT (*Botrytis paeoniae*). New Hampshire; Massachusetts, "More injurious than in most past seasons"; New Jersey, on *P. albiflora*; Ohio; Michigan, "Much more prevalent than for several years due to favorable moisture conditions"; Wisconsin; Minnesota, "An unusually small amount of this very common disease was observed"; Iowa, less than usual, trace; Washington.

LEAF MOLD (*Cladosporium paeoniae*). New Jersey, on *P. albiflora*; Wisconsin; Minnesota, "Many spots on buds and petals."

STEM CANKER (*Coniothyrium* sp.). California.

ANTHRACNOSE (Glomerella cingulata). North Carolina.

BLIGHT (Phytophthora sp.). Wisconsin; Minnesota, "Unusually abundant during May and early June.

BLIGHT (Septoria paeoniae berolinensis). Michigan, "Caused serious damage to some varieties in the College variety test plots. Has been observed previously in other localities but not identified. Canker formation on stems results in wilt and death of shoots."

ROOT KNOT (Heterodera marioni). New Jersey; Wisconsin, more than usual; Michigan, "Increasing slowly but surely and destined to be, if not already, the most important peony disease. Commercial stocks are becoming generally infested."

MOSAIC (virus). New Jersey, on P. albiflora; California.

P E L A R G O N I U M sp.

LEAF SPOT (Alternaria sp.). Texas.

BLIGHT (Botrytis sp.). New Jersey.

BACTERIAL BLIGHT (Pseudomonas sp.). Texas.

OEDEMA (undetermined). Massachusetts.

P E T U N I A H Y B R I D A

MOSAIC (virus). Kansas.

P H I L O D E N D R O N G I G A N T E U M

ANTHRACNOSE (Colletotrichum philodendri). New Jersey.

P H L O X sp.

LEAF SPOT (Cercospora sp.). Kansas.

POWDERY MILDEW (Erysiphe cichoracearum). Connecticut; Minnesota, "Very heavy infections in some gardens"; Washington.

POWDERY MILDEW (Oidium sp.). Texas.

STEM ROT (Rhizoctonia sp.). New Jersey, on P. paniculata.

CROWN ROT (Sclerotium delphinii). New Jersey, on P. paniculata; Connecticut.

LEAF SPOT (*Septoria* sp.). Michigan, "Common on some varieties of perennial phlox causing defoliation of lower part of plant."

LEAF SPOT (*Vermicularia phlogina*). New Jersey, on *P. subulata*.

PHOTINIA ARBUTIFOLIA

SCAB (*Fusicladium photinicola*). California.

RUST (*Gymnosporangium japonicum*) occurred in a nursery in San Joaquin County, California. It is found only rarely in the State.

PHYSALIS sp.

SMUT (*Entyloma australe*). Iowa.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

MOSAIC (virus). New Jersey.

PHYSOSTEGIA VIRGINIANA

CROWN ROT (*Sclerotium delphinii*). Connecticut, New Jersey, and Kansas.

PODOPHYLLUM PELTATUM

RUST (*Puccinia podophylli*). New Jersey.

POINSETTIA PULCHERRIMA

LEAF SPOT (*Cercospora* sp.). Texas.

CROWN ROT (*Corticium vagum*). Texas.

STEM ROT (*Fusarium* sp.). New Jersey, on cuttings and young potted plants.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

RUST (*Uromyces proeminens*). Texas.

POLIANTHES TUBEROSA

LEAF SPOT (*Cercospora* sp.). Texas.

TUBER ROT (*Pythium debaryanum*). Texas.

P O T E N T I L L A   C A N A D E N S I S

CROWN ROT (Sclerotium delphinii. Connecticut.

P R I M U L A sp.

CROWN ROT (Botrytis sp.). New Jersey.

LEAF SPOT (Ramularia primulae). Wyoming, on P. parryi.

CROWN ROT (Rhizoctonia sp.). Texas.

BACTERIAL SPOT (Bacterium primulae). California.

P U E R A R I A   T H U N B E R G I A N A

ROOT ROT (Phymatotrichum omnivorum). Texas.

BACTERIAL BLIGHT (Bacterium vignae). New Jersey.

P Y R A C A N T H A spp.

SCAB (Venturia sp.). Washington.

BLIGHT (Bacillus amylovorus). Delaware, "Ornamental types show more general infection than usual."

R H O D O D E N D R O N spp.

LEAF SPOT (Pestalozzia guepini). Connecticut.

LEAF SPOT (Pestalozzia macrotricha). New Jersey, following winter injury to foliage.

LEAF SPOT and CANKER (Phomopsis sp.). New Jersey, on R. carolinianum.

LEAF SPOT (Phyllosticta saccardoi). New Jersey.

BLIGHT (Phytophthora cactorum). New Jersey.

R H O D O T Y P O S   K E R R I O I D E S

ANTHRACNOSE (Gloeosporium sp.). Illinois.

R O S A spp.

LEAF SPOT (Alternaria sp.). Texas.

ROOT ROT (*Armillaria mellea*). Texas.

CANE BLIGHT (*Botryosphaeria ribis*). Texas.

BUD BLIGHT (*Botrytis* sp.). Texas; Michigan, "*B. cinerea*. Bud blast and distortion of the youngest leaves was common on Talisman plants in one large commercial rose house in January and again in November. Dull weather and high humidity were contributing factors"; Washington.

LEAF SPOT (*Cercospora rosaecola*). Alabama, "At Tuskegee, almost defoliates the Silver Moon variety"; Texas.

CANE CANKER (*Coniothyrium fuckelii*). Massachusetts; New Jersey, "Occurs throughout the year in greenhouses and in spring on outdoor roses"; Mississippi; Texas; California.

BRAND CANKER (*Coniothyrium wernsdorffiae*). Texas.

STEM CANKER (*Coryneum microstictum*). Washington.

BROWN CANKER (*Diaporthe umbrina*). New Jersey, Pennsylvania, Mississippi, and Texas.

BLACK SPOT (*Diplocarpon rosae*). Massachusetts, "More injurious than in most past seasons"; Connecticut, common; New Jersey; Pennsylvania, more than usual; District of Columbia; Mississippi; Louisiana; Texas; Arkansas, "Much more prevalent than in an average season"; Michigan, "Much more than the usual amount, severe defoliation in the average planting where dusting or spraying was not done frequently"; Iowa, more than usual; South Dakota; Kansas, less than usual but more than in 1934; Washington.

TWIG BLIGHT (*Diplodia* sp.). Texas.

ANTHRACNOSE (*Gloeosporium* sp.). Texas, *G. rosae*; Washington.

STEM BLIGHT (*Macrophoma* sp.). Texas.

DIE BACK (*Pestalozzia* sp.). Texas.

CANKER (*Phoma* sp.). Texas.

RUST (*Phragmidium montivagum*). Wyoming and Washington.

RUST (*Phragmidium subcorticinum*). Texas.

RUST (*Phragmidium* sp.). Texas and Wisconsin.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

ANTHRACNOSE (*Sphaceloma rosarum*). Pennsylvania.

POWDERY MILDEW (*Sphaerotheca humuli*). Pennsylvania and Iowa.

POWDERY MILDEW (*Sphaerotheca pannosa*). Massachusetts, "Came early, June 2, especially injurious, more than in five years"; Connecticut; New Jersey; Tennessee, "Very abundant in nurseries at McMinnville and Winchester, probably the most destructive disease present"; Mississippi; Texas; Arkansas, less important than usual; Michigan, "Much more evident than usual due to very high humidity in June and July"; Wisconsin; Kansas.

POWDERY MILDEW (*Sphaerotheca* sp.). District of Columbia; Virginia, very common; Louisiana.

CROWN GALL (*Bacterium tumefaciens*). Massachusetts; New Jersey; Pennsylvania; Texas; Wisconsin, "Mostly a greenhouse trouble, a few cases in a field of plants from Texas"; Kansas; Washington.

ROOT KNOT (*Heterodera marioni*). Texas.

MOSAIC (virus). New Jersey; Mississippi, "First report from the State, determination verified by R. P. White"; Arkansas, "Apparently the first finding in the State"; Michigan, "In one large commercial range of 250,000 plants mosaic was found in 2 to 3 percent of the plants in some varieties which were obtained in California. Affected plants worthless for flower production."

CHLOROSIS (Selenium injury ?). "Chlorosis resembling that described on wheat was observed in Michigan in certain varieties of roses which had been sprayed two seasons with a selenium compound. No other cause for the chlorosis could be found." (R. Nelson).

RYNCHOSPORA CORNICULATA

SMUT (*Testicularia cyperi*). Texas.

SAGITTARIA SAGITTIFOLIA

SOOTY MOLD (*Fumago vagans*). New Jersey.

SALVIA SPLENDENS

RUST (*Puccinia menthae*). Connecticut.

S A M B U C U S sp.

ROOT ROT (Phymatotrichum omnivorum). Texas.

RUST (Puccinia sambuci). Wisconsin.

S A P I N D U S sp.

POWDERY MILDEW (Uncinula circinata). Texas.

MOSAIC (virus). Texas.

S E N E C I O C R U E N T U S

FOOT ROT (Phytophthora sp.). New Jersey.

WILT (Verticillium albo-atrum). Washington.

STEM ROT and WILT (undetermined fungus). Michigan, "Reported by florists as common during dull weather in December and January. Girdling of stem like that caused by Sclerotinia but this fungus is not the cause, some vascular invasion also."

S E N E C I O sp.

POWDERY MILDEW (Sphaerotheca humuli). Wyoming.

S E M P E R V I V U M sp.

RUST (Endophyllum sempervivi). New Jersey.

S E S B A N I A sp.

ROOT ROT (Phymatotrichum omnivorum). Texas.

NEMATODE (Anguillulina pratensis). North Carolina.

ROOT KNOT (Heterodera marioni). Texas.

S K I M M I A J A P O N I C A

ANTHRACNOSE (Gloeosporium sp.). New Jersey.

S O L I D A G O sp.

LEAF SPOT (Coleosporium solidaginis). Alabama, on S. serotina gigantea.

LEAF SPOT (*Rhytisma solidaginis*). New Jersey, on *S. canadensis*.

S O P H O R A

DIE BACK (*Diplodia sophorae*). New Jersey, on *S. japonica*.

LEAF SPOT (*Macrosporium* sp.). Texas, on S. affinis.

S Y M P H O R I C A R P O S sp.

ROT (*Alternaria* sp.). Massachusetts.

ROT (*Botrytis* sp.). Massachusetts.

ANTHRACNOSE (*Glomerella cingulata*). Massachusetts and Wisconsin.

ROT (*Penicillium* sp.). Massachusetts.

S Y R I N G A V U L G A R I S

LEAF SPOT (*Macrosporium commune*). Maryland.

POWDERY MILDEW (*Microsphaera alni*). New Hampshire; Massachusetts, less damaging than usual; Connecticut, less due to dry fall; New Jersey; Pennsylvania; District of Columbia; Virginia, has been very common; Texas; Wisconsin; Iowa, less than usual, trace; Kansas.

LEAF SPOT (*Phoma* sp.). Wisconsin.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

BACTERIAL BLIGHT (*Bacterium syringae*). Massachusetts, New Jersey, Tennessee, Michigan, and Washington.

GRAFT BLIGHT (uncongenial scion). Massachusetts and Washington.

T A G E T E S sp.

LEAF SPOT (*Alternaria* sp.). New Jersey, on *T. erecta*.

WILT (*Fusarium* sp.). New Jersey, on *T. erecta*.

ROOT ROT (*Rhizoctonia* sp.). Texas.

BACTERIAL WILT (*Bacterium solanacearum*) on *T. erecta*, Charleston, South Carolina.

T A R A X A C U M   O F F I C I N A L E

RUST (*Puccinia hieracii*). Pennsylvania, South Dakota, Wyoming, and Washington.

LEAF SPOT (*Ramularia taraxaci*). Wyoming.

POWDERY MILDEW (*Sphaerotheca* spp.). Connecticut, *S. castagnei* on cultivated dandelions; Washington, *S. humuli*.

T R A C H Y M E N E   C A E R U L E A

STEM ROT (*Fusarium* sp.). New Jersey.

T R I B U L U S   sp.

DODDER (*Cuscuta umbellata*). New Mexico.

ROOT KNOT (*Heterodera marioni*). Kentucky, on *T. terrestris*.

T R O P A E O L U M   M A J U S

LEAF SPOT (*Pleospora tropaeoli*). Mississippi, first report from the State.

STEM and ROOT ROT (*Rhizoctonia* sp.). Minnesota, "Doing considerable damage in a commercial seed trial plot."

SPOTTED WILT (virus). California.

T U L I P A   sp.

BOTRYTIS BLIGHT (*Botrytis tulipae*). New Hampshire, very prevalent; Massachusetts, "More injurious than in most past seasons"; New Jersey; Pennsylvania; Ohio; Michigan, "Old plantings very generally attacked"; Wisconsin; Washington.

GREY BULB ROT (*Rhizoctonia tuliparum*). Delaware, "Very prevalent in beds top-dressed with manure."

MOSAIC (virus). Pennsylvania, Arkansas, and Washington.

V A C C I N I U M   M Y R T I L L U S

RUST (*Pucciniastrum goeppertianum*). Wyoming.

VENIDIUM sp.

WILT (*Verticillium dahliae*). New Jersey.

VERBASCUM BLATTARIA

LEAF SPOT (*Septoria verbascicola*). Mississippi.

VIBURNUM sp.

GALL (*Phomopsis* sp.). District of Columbia, on *V. opulus*.

POWDERY MILDEW (*Oidium* sp.). Texas.

VIOLA sp.

LEAF SPOT (*Alternaria* sp.). New Jersey, on *V. tricolor*; Texas.

LEAF SPOT (*Cercospora* sp.). Alabama, *C. violae* on *V. odorata*; Louisiana, *C. violae*; South Dakota, *C. granuliformis*.

ANTHRACNOSE (*Colletotrichum violae-tricoloris*). Connecticut.

RUST (*Puccinia violae*). Connecticut; New Jersey, on *V. odorata*.

LEAF SPOT (*Ramularia* sp.). Washington.

CROWN ROT (*Sclerotium delphinii*). Connecticut.

SCAB (*Sphaceloma violae*). Pennsylvania; New Jersey, on *V. odorata*.

MOSAIC (virus ?). Washington.

YELLOWS (unknown). Maryland on *V. tricolor*.

VINCA MINOR

SCORCH (*Phomopsis lirella*). New Jersey.

WATSONIA sp.

ROOT ROT (*Armillaria mellea*). California.

WEIGELA sp.

LEAF SPOT (*Cercospora weigelae*). Mississippi, on *W. rosea*.

LEAF SPOT (*Ramularia diervillae*). Tennessee.

ROOT ROT (*Phymatotrichum omnivorum*). Texas.

ZANTEDESCHIA sp.

ROOT ROT (*Phytophthora* sp.). California.

SOFT ROT (*Bacillus carotovorus* and *B. aroideae*). California, "Eighty percent of bulbs affected in one planting near Santa Cruz."

MOSAIC (virus). Oregon.

SPOTTED WILT (virus). California.

ZINNIA ELEGANS

LEAF SPOT (*Alternaria* sp. ?). Connecticut.

LEAF SPOT (*Cercospora atricincta*). Texas.

POWDERY MILDEW (*Erysiphe cichoracearum*). Connecticut, Pennsylvania, Texas, North Dakota, and Kansas.

STEM ROT (*Fusarium* sp.). New Jersey.

ROOT ROT (*Rhizoctonia* sp.). Texas.

CHARCOAL STEM ROT (*Rhizoctonia bataticola*). Texas.

MOSAIC (virus). Kansas.

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Index to Supplements 91 - 96

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Plant Disease Reporter
Supplement 97

December 31, 1936

A

Actinomyces sp., sweet potato, 210.
scabies, beet, 194.
potato, 57, 226.
radish, 225
Solanum tuberosum, 80.
turnip, 199.
Albugo bliti, Amaranthus retroflexus, 80.
candida, Camelina microcarpa, 80.
Capsella bursa-pastoris, 80.
horseradish, 224.
Lepidium sp., 276.
radish, 225.
Sisymbrium altissimum, 80.
turnip, 200.
ipomoeae panduranae, Ipomoea spp.,273.
platensis, Boerhaavia erecta, 264.
tragopogonis, Tragopogon porrifolius, 80, 232.
pratensis, 80.
Aleurodiscus acerinus, Quercus virginiana, 253.
Alternaria sp., apple, 166.
Asparagus, 194.
barley, 133.
Canna indica, 265.
Cassia sp., 266.
Cephalanthus occidentalis, 266.
cotton, 233.
Hibiscus spp., 272.
Lathyrus odoratus, 275.
lettuce, 211.
Magnolia spp., 247.
onion, 189.
Alternaria sp., parsley, 219.
Pelargonium sp., 280.
pepper, 200.
pumpkin, 207.
raspberry, 181.
Rosa spp., 282.
Symphoricarpos sp., 286.
Tagetes erecta, 286.
turnip, 200.
Viola tricolor, 288.
Zinnia elegans, 289.
atrans, soybean, 151.
brassicae, broccoli, 196.
cabbage, 197.
cauliflower, 196.
radish, 225.
rutabaga, 195.
turnip, 200.
cucumerina, cantaloupe, 203.
cucumber, 204.
squash, 206.
watermelon, 202.
dianthi, Dianthus sp., 269.
caryophyllus, 269.
fasciculata, bean, 220.
herculea, turnip, 200.
panax, ginseng, 238.
radicina, carrot, 208.
solani, eggplant, 226.
potato, 57, 88, 227.
Solanum tuberosum, 88.
tomato, 58, 60, 213.
tenuis, tobacco, 236.
tomato, tomato, 58, 60, 213.
Anguillulina dihystera, Alternanthera phylloxeroides, 260.

Anguillulina dipsaci, alfalfa, 150.
Hyacinthus orientalis, 273.
pratensis, apple, 172.
rutabaga, 196.
Sesbania sp., 285.
Ulmus parvifolia, 259.
tritici, wheat, 144.
Aphanomyces euteiches, pea, 222.
raphani, radish, 225.
Aphelenchoides fragariae, Chrysanthemum hortorum, 267.
Dahlia sp., 268.
strawberry, 75, 165.
Apiosporium collinsii, Amelanchier sp., 261.
Aplanobacter insidiosum, alfalfa, 150.
Medicago sativa, 79.
michiganense, tomato, 216.
stewarti, corn, 52.
field corn, 147.
sweet corn, 54, 148.
Armillaria mellea, apple, 166.
apricot, 173.
blackberry, 179.
cherry, 174.
grape, 184.
hackberry, 243.
Paeonia sp., 279.
peach, 159.
poplar, 251.
Quercus spp., 253.
raspberry, 181.
Rosa spp., 283.
Watsonia sp., 288.
Ascochyta spp., green peas, 65, 66.
Lolium spp., 156.
pea, 223.
sweet clover, 151.
meliloti, Melilotus alba, 85.
pinodella, pea, 223.
pisi, Lathyrus odoratus, 275.
pea, 223.
vetch, 153.
rhei, rhubarb, 225.
Ascochytula asparagina, Asparagus plumosus, 263.
Aspergillus spp., field corn, 144, 146.
Aspergillus spp., sorghum, 138, 139.
nidulans, onion, 189.
niger, Allium cepa, 87.
garlic, 191.
onion, 189.
peach, 159.
Atropellis pinicola, Pinus sp., 249.

B

Bacillus sp., cowpea, 154.
amylovorus, apple, 70, 79, 171.
apricot, 174.
Crataegus monogyna rosea, 79.
oxyacantha, 244.
pear, 69, 178.
Prunus sp., 79.
melanocarpa, 252.
Pyracantha spp., 282.
Pyrus communis, 79.
malus, 79.
quince, 163.
Sorbus americana, 256.
aroideae, Zantedeschia sp., 289.
carotovorus, cabbage, 199.
carrot, 208.
cauliflower, 197.
celery, 192.
cucumber, 205.
Iris spp., 274.
lettuce, 212.
Lilium spp., 277.
onion, 191.
parsnip, 219.
pear, 179.
pepper, 201.
rutabaga, 195.
Solanum tuberosum, 79.
tobacco, 237.
turnip, 200.
Zantedeschia sp., 289.
lathyri, cowpea, 154.
Lathyrus odoratus, 275.
phytophthorus, potato, 57, 229.
tracheiphilus, cantaloupe, 204.
cucumber, 205.
pumpkin, 207.

Bacillus tracheiphilus, squash, 206.
summer squash, 207.
Bacterial leaf blight (undet.), Iris spp., 274.
spot, Begonia sp., 264.
rot (undet.), Dahlia sp., 268.
Bacterium spp., bean, 221.
cantaloupe, 204.
dry beans, 64.
filbert, 186.
snap beans, 62, 63.
andropogoni, sorghum, 139.
Sorghum vulgare sudanense, 158.
angulatum, tobacco, 237.
apii, celery, 193.
atrofaciens, wheat, 144.
beticola, sugar beet, 239.
campestre, Brassica oleracea, 79.
broccoli, 196.
Brussels sprouts, 199.
cabbage, 199.
cauliflower, 197.
turnip, 200.
cannae, Canna indica, 265.
cerasi, apricot, 174.
citri, Citrus spp., 163.
coronafaciens, Avena sativa, 79.
oats, 79, 132.
atropurpureum, Bromus inermis, 155.
cucurbitae, squash, 207.
delphinii, Delphinium sp., 269.
dissolvens, field corn, 147.
sweet corn, 149.
flaccumfaciens, bean, 221.
flavozonatum, Begonia sp., 264.
glycineum, soybean, 152.
gummisudans, Gladiolus sp., 271.
gypsophilae, Gypsophila paniculata, 272.
hederae, Hedera helix, 272.
holci, sorghum, 139.
Sorghum vulgare sudanense, 79.
holcicola, sorghum, 139.
juglandis, Juglans regia, 188.
lachrymans, cucumber, 205.
maculicola, cabbage, 199.
cauliflower, 197.
Bacterium malvacearum, cotton, 67, 235.
marginatum, Freesia sp., 271.
Gladiolus sp., 271.
medicaginis, Medicago sativa, 79.
phaseolicola, bean, 221.
mori, mulberry, 173.
phaseoli, bean, 79, 221.
lima bean, 220.
Phaseolus vulgaris, 79.
sojense, soybean, 152.
pisi, cowpea, 154.
pea, 65, 66, 79, 224.
Pisum sativum, 79.
primulae, Primula sp., 282.
pruni, apricot, 174.
cherry, 175.
peach, 160.
plum, 177.
punctatum, tomato, 217.
rubrilineans, sugar cane, 239.
solanacearum, peanut, 233.
potato, 229.
Tagetes erecta, 286.
tobacco, 237.
tomato, 217.
syringae, cherry, 175.
Syringa vulgaris, 79, 286.
tabacum, tobacco, 237.
tardicrescens, bearded iris, 274.
tonellianum, Nerium oleander, 279.
translucens, barley, 80, 135.
Hordeum vulgare, 80.
secalis, Secale cereale, 80.
undulosum, Triticum aestivum, 80.
wheat, 144.
tumefaciens, almond. 186.
apple, 171.
blueberry, 183.
Ceanothus sp., 266.
cherry, 175.
Chrysanthemum hortorum, 267.
Cydonia japonica, 268.
grape, 185.
Lathyrus odoratus, 275.
Lycopersicum esculentum, 80.
peach, 161.
plum, 177.

Bacterium tumefaciens, poplar, 252.
quince, 163.
raspberry, 182.
Rosa spp., 284.
Rubus sp., 80.
Salix babylonica, 255.
Vitis sp., 80.
youngberry, 183.
vesicatorium, pepper, 201.
tomato, 217.
vignae, lima bean, 220.
Pueraria thunbergiana, 282.
woodsii, Dianthus caryophyllus, 269.
Basisporium gallarum, field corn, 144, 147.
Big vein (virus), lettuce, 212.
Bitter pit (non-par.), apple, 172.
Black heart (non-par.), celery, 193.
potato, 231.
root, strawberry, 75, 165.
Blade blight (undet.), oats, 132.
Blast, oats, 132.
onion, 191.
Blight (undet.), yam, 209.
Blossom-end rot (non-par.), pepper, 201.
tomato, 58, 60, 218.
Bolting (non-par.), celery, 193.
Botryosphaeria sp., Cercis canadensis, 243.
berengeriana, Juniperus virginiana, 246.
ribis, Rosa spp., 283.
Botrytis sp., apple, 166.
Calendula officinalis, 264.
Callistephus chinensis, 265.
celery, 191.
Chrysanthemum hortorum, 266.
cucumber, 205.
Euphorbia marginata, 270.
Helleborus niger, 272.
Lathyrus odoratus, 275.
Lilium candidum, 276.
regale, 276.
onion, 189.
Pelargonium sp., 280.
Primula sp., 282.
raspberry, 181.
Symphoricarpos sp., 286.
Botrytis sp., Trifolium incarnatum, 152.
allii, Allium cepa, 87.
cinerea, Aquilegia sp., 262.
asparagus, 194.
bean, 220.
blackberry, 179.
Cornus florida, 244.
paniculata, 244.
Dianthus caryophyllus, 269.
Delphinium sp., 268.
Iris spp., 273.
lettuce, 211.
Matthiola sp., 277.
pear, 177.
raspberry, 181.
Rosa spp., 283.
strawberry, 164.
tomato, 213.
convoluta, Iris spp., 273.
elliptica, Lilium candidum, 276.
narcissicola, Narcissus sp., 278.
paeoniae, Paeonia sp., 87.
albiflora, 279.
tulipae, Tulipa sp., 87, 287.
vulgaris, Dianthus caryophyllus, 87.
Bremia lactucae, lettuce, 212.
Briosia amphelophaga, grape, 184.
Bronzing (undet.), grape, 185.
Brown root rot (undet.), tobacco, 238.
stain (non-par.), filbert, 187.
Buckskin (virus), cherry, 176.
Bud drop (non-par.), pear, 179.
Bulb rot (unknown), Lilium spp., 277.
Lilium longiflorum giganteum, 277.

C

Calico, celery, 193.
potato, 231.
Canker, filbert, 187.
Ilex spp., 246.
Capnodium sp., Gardenia florida, 271.
pini, Pinus strobus, 249.
Cenangium taeda, Pinus taeda, 249.
Cephaleuros virescens, Magnolia spp., 24[illegible]

Cephalobus elongatus, peanut, 233.
Cephalosporium sp., elm, 256.
    acremonium, field corn, 145, 148.
    ulmi, Ulmus americana, 256.
Cephalothecium sp., grape, 184.
        quince, 163.
Ceratostomella sp., sycamore, 251.
    fimbriata, sweet potato, 55, 210.
    ulmi, inoculation experiments, 257.
        Ulmus spp., 257.
Cercospora sp., Hibiscus sabdariffa, 272.
        Phlox sp., 280.
        Poinsettia pulcherrima, 281.
        Polianthes tuberosa, 281.
        sweet clover, 151.
    althaeina, Althaea rosea, 260.
        cotton, 233.
    apii, celery, 191.
        carotae, carrot, 208.
        pastinacae, parsnip, 219.
    armoraciae, horseradish, 224.
    atricincta, Zinnia elegans, 289.
    beticola, beet, 194.
        mangel, 195.
        spinach, 231.
        sugar beet, 68, 239.
        swiss chard, 195.
    canescens, bean, 220.
    capsici, pepper, 201.
    cercidicola, redbud, 243.
    chrysanthemi, Chrysanthemum hortorum, 266.
    circumscissa, Prunus pennsylvanica, 88.
    citrullina, watermelon, 202.
    cruenta, bean, 220.
        cowpea, 153.
    cucurbitae, cantaloupe, 203.
    davisii, sweet clover, 151.
    diazu, cowpea, 153.
        soybean, 151.
    fusca, pecan, 187.
    granuliformis, Viola sp., 288.
    halepensis, Sorghum halepense, 158.
    ilicicola, Ilex sp., 246.
    ligustri, Ligustrum sp., 276.
    lythracearum, Lagerstroemia sp., 275.
Cercospora mali, apple, 167.
    medicaginis, alfalfa, 149.
    meliae, chinaberry, 248.
    nicotianae, tobacco, 236.
    nymphaeacea, Nymphaea sp., 279.
    personata, peanut, 233.
    rosaecola, Rosa spp., 283.
    seminalis, buffalo grass, 155.
    sorghi, field corn, 145.
    sphaeriaeformis, Ulmus spp., 258.
    stizolobii, soybean, 152.
    symphoricarpi, Symphoricarpos albus, 89.
    violae, Viola sp., 288.
        odorata, 288.
    weigelae, Weigela rosea, 288.
    zebrina, Melilotus indica, 151.
Cercosporella sp., blackberry, 180.
        dewberry, 180.
    caryigena, pecan, 187.
    herpotrichoides, Hordeum vulgare, 88.
        Triticum aestivum, 88.
        wheat, 88, 140.
    mori, mulberry, 173.
    virgaurae, Solidago missouriensis, 88.
Cerebella andropogonis, Sorghastrum nutans, 158.
Chemical injufy (fumes), apple, 172.
Chlorosis, Acer negundo, 241.
    apricot, 174.
    bean, 222.
    dewberry, 181.
    flax, 136.
    Gardenia florida, 271.
    grape, 185.
    Ilex vomitoria, 246.
    oats, 132.
    pea, 224.
    peach, 162.
    peanut, 233.
    pear, 179.
    persimmon, 244.
    Robinia pseudoacacia, 254.
    Rosa spp., 284.
Choanephora cucurbitarum, squash, 206.
Chrysomyxa cassandrae, Picea mariana, 248.

Chrysomyxa ledi, Ledum columbianum, 92.
ledicola, Picea glauca, 248.
Cladosporium sp., apple, 166, 167.
Cephalanthus occidentalis, 266.
sycamore, 251.
Ulmus spp., 258.
spp., Lolium spp., 156.
album, Lathyrus odoratus, 275.
carpophilum, almond, 186.
apricot, 173.
cherry, 174.
peach, 72, 159.
plum, 176.
cucumerinum, cucumber, 205.
squash, 206.
summer squash, 207.
effusum, pecan, 187.
fulvum, Lycopersicum esculentum, 89.
tomato, 214.
paeoniae, Paeonia albiflora, 279.
pisicola, pea, 223.
vignae, cowpea, 153.
Claviceps paspali, Paspalum spp., 157.
purpurea, Agropyron pauciflorum, 84, 154.
Agropyron pseudorepens, 154.
repens, 154.
smithii, 154.
Andropogon furcatus, 154.
barley, 133.
Elymus canadensis, 84.
condensatus, 84, 156.
glauca, 156.
macounii, 156.
virginicus, 156.
Koeleria cristata, 156.
Poa canbyi, 157.
redtop, 154.
rye, 50, 137.
Sorghastrum nutans, 158.
wheat, 140.
Coccomyces dentatus, Mahonia repens, 83.
hiemalis, cherry, 73, 175.
Prunus pennsylvanica, 252.
prunophorae, plum, 176.
Coleosporium ipomoeae, Ipomoea spp., 273.
Coleosporium solidaginis, Aster conspicuus, 92.
Callistephus chinensis, 265.
Pinus banksiana, 249.
nigra austriaca, 249.
resinosa, 249.
Solidago sp., 92.
missouriensis, 92.
serotina gigantea, 285.
salebrosa, 92.
Colletotrichum sp., Camellia japonica, 265.
Dieffenbachia sp., 270.
yam, 209.
antirrhini, Antirrhinum majus, 261.
atramentarium, potato, 227.
circinans, onion, 189.
destructivum, tobacco, 236.
erumpens, rhubarb, 225.
falcatum, sugar cane, 239.
gloeosporioides, Citrus taitensis, 267.
graminicolum, rye, 137.
wheat, 140.
lagenarium, cantaloupe, 203.
cucumber, 205.
gourd, 208.
squash, 206.
watermelon, 203.
lindemuthianum, bean, 220.
dry beans, 64.
lima bean, 219.
snap beans, 62, 63.
lineola, sorghum, 138.
Sorghum vulgare sudanense, 158.
flax, 135.
nigrum, pepper, 201.
philodendri, Philodendron giganteum 280.
phomoides, tomato, 214.
pisi, pea, 223.
pollaccii, Aucuba japonica aurea, 263.
spinaciae, spinach, 231.
trifolii, alfalfa, 149.
clover, 152.

Colletotrichum truncatum, lima bean, 219.
violae-tricoloris, Viola sp., 288.
Coniothyrium sp., apple, 167.
Paeonia sp., 279.
Ulmus spp., 258.
fuckelii, Rosa spp., 283.
pyrinum, apple, 167.
ulmi, Ulmus americana, 258.
wernsdorffiae, Rosa spp., 283.
Corky center (drought), grape, 185.
Corm rots, Gladiolus sp., 271.
Corticium sp., Quercus virginiana, 253.
koleroga, fig, 163.
Magnolia spp., 247.
salmonicolor, fig, 163.
stevensii, apple, 167.
vagum, Antirrhinum majus, 261.
bean, 220.
cabbage, 197.
carrot, 208.
cauliflower, 196.
Chrysanthemum hortorum, 266.
cotton, 234.
eggplant, 226.
endive, 202.
escarole, 202.
undet. Gramineae, 158.
horseradish, 224.
Lathyrus odoratus, 275.
lettuce, 212.
lima bean, 219.
pea, 223.
peanut, 233.
Poinsettia pulcherrima, 281.
potato, 56, 100, 227.
Solanum tuberosum, 100.
sugar beet, 239.
sweet potato, 210.
tobacco, 236.
tomato, 214.
turnip, 200.
Coryneum beijerinckii, almond, 186.
Amygdalus persica, 86.
apricot, 86, 173.
cherry, 175.
peach, 86, 159.
Prunus sp., 86.
Coryneum beijerinckii, Prunus armeniaca, 86.
microstictum, Rosa spp., 283.
Rubus sp., 86.
Crack stem (non-par.), celery, 193.
Crinkle (virus), strawberry, 165.
mosaic (virus), potato, 230.
Cronartium comptoniae, Pinus nigra austriaca, 249.
Pinus rigida, 249.
sylvestris, 249.
quercuum, Pinus banksiana, 250.
echinata, 250.
sylvestris, 250.
ribicola, Grossularia inermis, 92.
Pinus strobus, 250.
Ribes lacustre, 92.
petiolare, 92.
Crop losses in 1935, 43-75.
Crown disease (undet.), raspberry, 183.
injury, strawberry, 166.
Cryptosporella viticola, grape, 184.
Cumminsiella sanguinea, Mahonia aquifolium, 93.
Mahonia repens, 93.
Curly top (virus), bean, 222.
beet, 195.
cantaloupe, 204.
cucumber, 206.
pepper, 201.
spinach, 232.
squash, 207.
sugar beet, 68, 239.
summer squash, 207.
swiss chard, 195.
tomato, 58, 60, 217.
Vica faba, 153.
Cuscuta sp., alfalfa, 151.
carrot, 209.
Ligustrum sp., 276.
parsley, 219.
umbellata, Tribulus sp., 287.
Cyanospora albicedrae, Juniperus mexicana, 246.
Cylindrosporium brassicae, turnip, 200.
defoliatum, hackberry, 243.
iridis, Iris spp., 273.

Cylindrosporium kerriae, Kerria japonica, 275.
smilacinae, Smilacina stellata, 87.
veratrinum, Veratrum californicum, 87.
Cytospora sp., Acer palmatum, 240.
platanoides, 240.
rubrum, 240.
apple, 167.
apricot, 173.
cedrela, 243.
Douglas fir, 252.
Picea excelsa, 248.
orientalis, 248.
pungens, 248.
kosteri, 248.
Pinus excelsa, 250.
ponderosa, 250.
Ulmus spp., 258.
americana, 258.
carbonacea, Ulmus spp., 258.
chrysosperma, Populus alba bolleana, 251.
Populus deltoides, 251.
dentata, 251.
grandidentata, 251.
nigra italica, 251.
tremuloides, 251.
Salix alba, 254.
fragilis, 254.
ludibunda, Ulmus americana, 258.
sacchari, sugar cane, 239.

D

Daedalea confragrosa, Salix amygdaloides, 255.
Salix fragilis, 255.
quercina, Quercus spp., 253.
Damping-off, beet, 195.
carrot, 208.
parsnip, 219.
spinach, 232.
sugar beet, 239.
Dark center (undet.), rutabaga, 196.
Darluca filum, Puccinia coronata, 156.
Dasyscypha ellisiana, Pinus strobus, 250.
Dendrophoma obscurans, strawberry, 164.
Diachaea leucopoda, strawberry, 164.
Diamond canker (undet.), prune, 174.
Diaporthe batatatis, sweet potato, 210.
eres, Ilex spp., 246.
phaseolorum, lima bean, 219.
sojae, soybean, 151.
umbrina, Rosa spp., 283.
Didymella applanata, raspberry, 181.
youngberry, 183.
Didymellina iridis, Iris spp., 273.
xiphium, 274.
Didymosphaeria sp., Ulmus parvifolia, 258.
Dieback (undet.), blueberry, 183.
Cajanus indicus, 200.
Juglans regia, 189.
Diplocarpon earliana, strawberry, 75, 164.
rosae, Rosa spp., 83, 283.
Diplodia sp., cantaloupe, 204.
field corn, 147.
onion, 189.
persimmon, 244.
poplar, 251.
redbud, 243.
Rosa spp., 283.
watermelon, 203.
gossypina, cotton, 234.
longispora, Quercus alba, 253.
prinus, 253.
natalensis, peanut, 233.
tung oil tree, 242.
sophorae, Sophora japonica, 286.
tubericola, sweet potato, 210.
ulmi, Ulmus crassifolia, 258.
zeae, corn, 52.
field corn, 145.
sweet corn, 54, 148.
Diplodina graminea, Cynodon dactylon, 155.
salicicola, see Physalospora gregaria.
Discosia artoceras, Quercus spp., 253.
Distorted growth, apple, 172.
Dothichiza populea, Populus alba bolleana, 251.

Dothichiza populea, Populus nigra, 251.
Populus nigra italica, 251.
Dothichloe atramentosa, Andropogon sp., 155.
Dothiorella, elm, 256.
sp., Gleditsia triacanthos, 245.
ribis, Cydonia japonica, 268.
pear, 177.
Salix discolor, 255.
Drought, bean, 222.
cucumber, 206.
Juglans regia, 188.
pea, 224.
rhubarb, 226.
rye, 138.
injury, apple, 172.
wheat, 144.
spot, tobacco, 238.
Dry stem (arsenical injury), cherry, 176.

E

Ear rots, corn, 52.
field corn, 146.
Elsinoe ampelina, grape, 184.
phaseoli, bean, 220.
veneta, blackberry, 180.
dewberry, 180.
raspberry, 181.
youngberry, 183.
Endophyllum sempervivi, Sempervivum sp., 285.
Endothia parasitica, chestnut, 242.
chinquapin, 243.
Entomosporium thuemenii, Crataegus oxyacantha, 244.
Entyloma australe, Physalis sp., 281.
calendulae, Calendula officinalis, 264.
oryzae, rice, 137.
Epicoccum nigrum, Magnolia spp., 247.
Erysiphe cichoracearum, Amsinckia intermedia, 81.
artichoke, globe, 208.
Jerusalem, 209.
Aster novae-angliae, 81.
cantaloupe, 204.
Erysiphe cichoracearum, Chrysanthemum hortorum, 266.
cucumber, 205.
Dahlia sp., 268.
Delphinium sp., 269.
Helianthus annuus, 81, 272.
Lactuca scariola integrata, 81.
Madia glomerata, 81.
Mertensia ciliata, 278.
Phlox sp., 280.
pumpkin, 207.
squash, 206.
summer squash, 207.
Zinnia elegans, 289.
graminis, barley, 133.
Bromus inermis, 81.
vulgaris, 81.
Dactylis glomerata, 81.
Poa pratensis, 157.
rye, 138.
Triticum aestivum, 81.
wheat, 81, 140.
polygoni, Althaea rosea, 260.
Aquilegia sp., 262.
bean, 220.
Brassica campestris, 82.
buckwheat, 133.
cabbage, 197.
collards, 196.
cowpea, 153.
Dahlia sp., 268.
Delphinium sp., 82, 269.
Lathyrus odoratus, 275.
Lupinus sp., 82.
pea, 82, 223.
Pisum sativum, 82.
Polygonum aviculare, 82.
radish, 225.
rutabaga, 195.
Trifolium spp., 152.
hybridum, 82.
pratense, 82, 152.
procumbens, 152.
turnip, 200.
Exoascus cerasi, Prunus avium, 81.
demissa, 81.
deformans, Amygdalus persica, 81.

Exobasidium camelliae, Camellia japonica, 265.
vaccinii, Azalea, 263.
Exophoma magnoliae, Magnolia spp., 247.
Exosporium sp., Agave lecheguilla, 260.
concentricum, Euonymus sp., 270.
Ligustrum sp., 276.

F

Fabraea maculata, pear, 69, 177.
quince, 163.
Fasciation (Bacterial), Chrysanthemum hortorum, 267.
(non-par.), peach, 162.
Firing (non-par), tobacco, 238.
Fomes applanatus, apple, 167.
maple, 240.
peach, 159.
Quercus spp., 253.
fomentarius, maple, 240.
Quercus spp., 253.
fraxinophilus, Fraxinus pennsylvanica lanceolata, 245.
igniarius, maple, 240.
Quercus spp., 253.
Foot rots, rye, 138.
sweet corn, 148.
wheat, 46, 140.
Frenching (non-par.), tobacco, 238.
Frost damage, peach, 162.
injury, apple, 172.
bean, 222.
blueberry, 183.
pea, 224.
pepper, 202.
Fruit rots, strawberry, 75, 166.
spot, amoeboid, pear, 179.
(undet.), pepper, 202.
Fuligo sp., strawberry, 164.
cinerea, undet. Gramineae, 158.
Fumago sp., Gardenia florida, 271.
vagans, pear, 178.
Sagittaria sagittifolia, 284.
Fungi of Idaho, 77-113.
Fusarium, cotton, 234.
flax, 136.
Fusarium sp., Albizzia julibrissin, 241.
Asparagus, 194.
asparagoides, 263.
barley, 133.
carrot, 208.
celery, 192.
cotton, 234.
cucumber, 205.
Dianthus caryophyllus, 269.
field corn, 145, 147.
flax, 135.
Freesia sp., 271.
Gladiolus sp., 271.
Gypsophila sp., 272.
Iris spp., 274.
Juglans nigra, 188.
Kalanchoe globulifera coccinea, 274.
Lilium spp., 277.
auratum, 276.
Lonicera tatarica, 277.
Narcissus sp., 278.
pea, 223.
peanut, 233.
pepper, 201.
Poinsettia pulcherrima, 281.
potato, 228.
raspberry, 181.
spinach, 231.
squash, 206.
Tagetes erecta, 286.
tobacco, 236.
Trachymene caerulea, 287.
Ulmus spp., 258.
undet. Gramineae, 158.
wheat, 140.
yam, 209.
Zinnia elegans, 289.
spp., barley, 133, 134.
bean, 220.
field corn, 144, 145, 147.
oats, 131.
Pinus caribaea, 250.
palustris, 250.
taeda, 250.
potato, 57, 228.
Robinia pseudoacacia, 254.

Fusarium spp., sorghum, 138.
sweet corn, 148.
sweet potato, 55.
wheat, 140.
annuum, pepper, 201.
bulbigenum batatas, sweet potato, 210.
niveum, cantaloupe, 204.
cucumber, 205.
watermelon, 203.
cepae, see Fusarium oxysporum f. 7.
cepivorum, onion, 189.
conglutinans, cabbage, 197.
cauliflower, 196.
callistephi, Callistephus chinensis, 265.
flocciferum, Solanum tuberosum, 89.
hyperoxysporum, see Fusarium oxysporum f. 2.
lateritium, chinaberry, 248.
lini, flax, 135.
lycopersici, tomato, 58, 60, 214.
malli, see Fusarium solani, 189.
martii phaseoli, cowpea, 153.
see Fusarium solani martii f. 3.
pisi, see Fusarium solani martii f. 2.
moniliforme, cotton, 234.
field corn, 145, 147.
orthoceras apii, celery, 192.
pisi, green peas, 65, 66.
pea, 223.
oxysporum, potato, 227.
Solanum tuberosum, 89.
sweet potato, 210.
f. 2, sweet potato, 210.
f. 7, Allium cepa, 89.
f. 7, onion, 89, 189.
f. 8, pea, 223.
nicotianae, tobacco, 236.
redolens f. 1, Spinacia oleracea, 90.
sambucinum f. 6, Solanum tuberosum, 90.
solani, onion, 189.
eumartii, potato, 227.
martii f. 2, pea, 223.
f. 3, bean, 90, 220.
Fusarium solani martii f. 3, Phaseolus vulgaris, 90.
tracheiphilum, soybean, 151.
trichothecioides, Solanum tuberosum, 90.
vasinfectum, cotton, 67, 234.
okra, 210.
peanut, 233.
tracheiphilum, cowpea, 153.
zonatum f. 1, onion, 189.
Fusicladium photinicola, Photinia arbutifolia, 281.
saliciperdum, Salix alba, 255.
Salix blanda, 255.
elegantissima, 255.
Fusisporium rubi, raspberry, 181.

G

Giant hill (virus), potato, 229.
Gibberella saubinetii, barley, 48, 133.
field corn, 145, 146, 147.
oats, 131.
rye, 138.
wheat, 46, 140.
Gloeodes pomigena, apple, 167.
pear, 178.
Gloeosporium sp., Begonia sp., 263.
Dracaena fragrans, 270.
Eriobotrya japonica, 163.
Helleborus niger, 272.
Ilex spp., 246.
Ligularia kaempferi, 276.
maple, 240.
Nandina domestica, 278.
Prosopis glandulosa, 252.
Rhodotypos kerrioides, 282.
Skimmia japonica, 285.
Ulmus spp., 258.
Vaccinium corymbosum, 183.
apocryptum, Acer saccharinum, 240.
saccharum, 240.
aridum, ash, 245.
camphorae, Cinnamomum camphora, 243.
caulivorum, Trifolium pratense, 87.
cingulatum, Ficus elastica, 270.
pandurata, 270.

Gloeosporium diospyri, persimmon, 244.
equiseti, Equisetum hyemale, 87.
palmarum, Kentia forsteriana, 275.
perennans, apple, 87, 167.
Pyrus malus, 87.
ribis, Ribes vulgare, 87.
rosae, Rosa spp., 283.
salicis, Salix spp., 255.
tiliae, basswood, 256.
ulmicolum, Ulmus americana, 258.
parvifolia, 258.
pumila, 258.
Glomerella cingulata, apple, 70, 167.
Euonymus sp., 270.
grape, 184.
Juglans regia, 188.
Lathyrus odoratus, 275.
Ligustrum ovalifolium, 276.
Paeonia sp., 280.
pear, 178.
pepper, 201.
quince, 163.
Symphoricarpos sp., 286.
Vaccinium corymbosum, 183.
gossypii, cotton, 67, 234.
rubicola, raspberry, 181.
Glomerularia corni, Cornus canadensis, 88.
Glume spotting (undet.), rice, 137.
Gnomonia caryae pecanae, pecan, 187.
leptostyla, Juglans cinerea, 188.
Juglans nigra, 188.
nerviseda, pecan, 187.
ulmea, Ulmus americana, 258.
Ulmus parvifolia, 258.
pumila, 258.
veneta, Platanus occidentalis, 251.
orientalis, 251.
Quercus alba, 253.
kelloggii, 253.
Graft blight (uncongenial scion), Syringa vulgaris, 286.
Grey speck (physiological), oats, 132.
Guignardia aesculi, horsechestnut, 241.
bidwellii, Ampelopsis veitchii, 261.
grape, 74, 184.
Gymnoconia peckiana, blackberry, 180.
Gymnoconia peckiana, dewberry, 180.
raspberry, 181.
Rubus laciniatus, 93.
Gymnosporangium sp., Amelanchier sp., 261.
apple, 70.
Malus spp., 248.
clavipes, Amelanchier canadensis, 261.
apple, 168.
pear, 178.
Juniperus spp., 246.
quince, 163.
germinale, crab, 248.
flowering crab, 248.
globosum, Crataegus oxyacantha, 244.
Juniperus spp., 246.
wild crab, 168, 248.
japonicum, Photinia arbutifolia, 281.
juniperi-virginianae, apple, 167.
Juniperus virginiana, 246.
Malus ioensis, 248.
scheideckeri, 248.
wild crab, 248.
juvenescens, Amelanchier alnifolia, 99.
libocedri, pear, 178.

H

Hail injury, apple, 172.
peach, 162.
Haywire (undet.), potato, 231.
Heat canker (non-par.), flax, 136.
Helminthosporium spp., barley, 133, 134.
Cynodon dactylon, 155.
field corn, 146, 147.
flax, 135.
undet. Gramineae, 158.
oats, 131.
sorghum, 139.
wheat, 140.
avenae, oats, 131.
californicum, Hordeum vulgare, 89.
curvulum, rice, 136.
gramineum, barley, 48, 133.

Helminthosporium gramineum, Hordeum
vulgare, 89.
oryzae, rice, 136.
papulosum, apple, 169.
ravenelii, Sporobolus sp., 158.
indicus, 158.
sativum, barley, 89, 134.
Hordeum vulgare, 89.
Lolium spp., 156.
wheat, 140.
setariae, Setaria italica, 157.
siccans, Lolium perenne, 156.
teres, barley, 89, 134.
Hordeum vulgare, 89.
turcicum, Sorghum halepense, 158.
vulgare sudanense, 158.
Hendersonia curtisii, Narcissus sp., 278.
optuniae, Optunia sp., 279.
marioni, Alternanthera phylloxeroides,
260.
Althaea rosea, 260.
Antirrhinum majus, 262.
apple, 172.
bean, 222.
beet, 195.
Begonia sp., 264.
cabbage, 199.
cantaloupe, 204.
Cassia artemisioides, 266.
occidentalis, 266.
celery, 193.
Cimicifuga foetida simplex, 267.
cotton, 67, 235.
cucumber, 206.
Cydonia japonica, 268.
eggplant, 226.
Euphorbia preslii, 270.
fig, 164.
Gardenia florida, 271.
grape, 185.
Ipomoea pes-caprae, 273.
tuberculata, 273.
turpethum, 273.
Iris spp., 274.
Lathyrus odoratus, 275.
lettuce, 212.
lima bean, 220.
Heterodera marioni, okra, 210.
Paeonia sp., 280.
parsnip, 219.
pea, 224.
peach, 161.
pepper, 201.
potato, 229.
Rosa spp., 284.
Schinus molle, 255.
Sesbania sp., 285.
Setaria verticillata, 157.
viridis, 157.
squash, 207.
sweet potato, 211.
tobacco, 237.
tomato, 217.
Tribulus terrestris, 287.
Tung oil tree, 242.
turnip, 200.
watermelon, 203.
schachtii, sugar beet, 68.
Heterosporium sp., Angelica ampla, 261.
Lolium spp., 156.
gracile, Iris sp., 89.
magnoliae, Magnolia spp., 247.
variable, spinach, 231.
High temperature, filbert, 187.
Hopper burn (leaf hopper), potato, 57,
230.
injury (leaf hopper), cowpea, 154.
Hormodendron sp., Ulmus americana, 258.
Hyalopsora aspidiotus, Phegopteris
dryopteris, 92.
Hydnum erinaceus, Quercus spp., 253.
Hypoderma ilicinum, Quercus marilandica,
253.
Hypodermella abietis-concoloris, Abies
concolor, 240.
Hypoxylon pruinatum, poplar, 251.

I

Isariopsis griseola, bean, 221.

J

June yellows, strawberry, 166.

K

Kuehneola uredinis, blackberry, 180.
raspberry, 181.
Kunkelia nitens, blackberry, 180.
dewberry, 180.

L

Leaf blight (bacterial), field corn, 147.
curl (virus), raspberry, 182.
drop (non-par.), cherry, 176.
plum, 177.
necrosis (undet.), grape, 185.
roll (virus), potato, 56, 229.
scorch (undet.), ash, 245.
(non-par.), Juglans regia, 188.
strawberry, 166.
spot (undet.), ash, 245.
field corn, 147.
(bacterial), Forsythia sp., 270.
(undet.), horseradish, 225.
oats, 132.
(non-par.), prune, 174.
(undet.), sweet clover, 151.
spotting (undet.), rice, 137.
Leopard spot (undet.), peppermint, 236.
Leptosphaeria coniothyrium, blackberry, 180.
dewberry, 180.
raspberry, 182.
salvini, rice, 137.
Leptothyrium dryinum, Quercus imbricaria, 253.
pomi, apple, 169.
Lightning injury, grape, 185.
potato, 231.
Little peach (virus), peach, 161, 162.
Lophodermium pinastri, Pinus rigida, 250.
strobus, 250.

M

Macrophoma sp., cotton, 234.
Pinus halepensis, 250.
Rosa spp., 283.
Salix spp., 255.
Macrophoma candollei, Buxus sempervirens suffruticosa, 264.
cupressi, Cupressus pyramidalis, 244.
Macrosporium sp., apple, 167.
chinaberry, 248.
Cynodon dactylon, 155.
Dahlia sp., 268.
horseradish, 224.
onion, 190.
parsley, 219.
Robinia pseudoacacia, 254.
Sophora, 286.
Ulmus americana, 258.
carotae, carrot, 208.
commune, Syringa vulgaris, 286.
cucumerinum, see Alternaria cucumerina.
ornatissi, sorghum, 139.
parasiticum, garlic, 191.
leek, 191.
porri, onion, 190.
puccinioides, Hymenoclea monogyra, 273.
sarcinaeforme, see Thyrospora sarcinaeformae.
tomato, see Alternaria tomato.
Malnutrition, bean, 222.
buckwheat, 133.
cotton, 67, 235.
cucumber, 206.
field corn, 148.
lettuce, 212.
kohlrabi, 199.
lima bean, 220.
spinach, 232.
Marginal burning (undet.), pear, 179.
Marssonia sp., poplar, 251.
martini, Quercus muhlenbergii, 253.
populi, Salix fragilis, 255.
salicis, Salix spp., 255.
Marssonina panattoniana, endive, 202.
escarole, 202.
lettuce, 212.
potentillae, Potentilla rivalis, 87.
Measles (undet.), apple, 172.
Melampsora sp., poplar, 251.
abietis-canadensis, hemlock, 256.

Melampsora abietis-canadensis, poplar, 251.
    bigelowii, Salix spp., 255.
    lini, flax, 136.
    medusae, 251.
        Populus deltoides, 251.
Melampsoropsis ledicola, Picea glauca, 248.
Melanconis juglandis, Juglans sieboldiana, 246.
Melanconium fuligineum, grape, 184.
Melasmia menziesiae, Menziesia ferruginea, 86.
Merulius tremellosus, Betula lutea, 242.
Microsphaera alni, Cornus occidentalis, 82.
        Lathyrus odoratus, 275.
        Lonicera sp., 277.
            ciliosa, 82.
        pecan, 187.
        Syringa vulgaris, 286.
        vaccinii, Vaccinium corymbosum, 183.
    diffusa, lespedeza, 149.
        Symphoricarpos albus, 82.
    quercina, Quercus alba, 254.
Mild mosaic (virus), potato, 230.
Milesia polystichi, Polystichum munitum, 92.
Molds, sorghum, 139.
Monilochaetes infuscans, sweet potato, 211.
Morenoella quercina, Quercus stellata, 254.
Moron (undet.), potato, 231.
Mosaic (virus), Abutilon theophrasti, 260.
        alfalfa, 150.
        Amaranthus sp., 261.
        Antirrhinum majus, 262.
        Apium graveolens rapaceum, 193.
        apple, 172.
        Aquilegia sp., 262.
        bean, 62, 63, 64, 222.
        blackberry, 180.
        cabbage, 199.
        cantaloupe, 204.
        cauliflower, 197.
Mosaic (virus), celery, 193.
        cherry, 176.
        cotton, 235.
        crotalaria, 149.
        cucumber, 206.
        Dahlia sp., 268.
        Delphinium sp., 269.
        dry beans, 64.
        eggplant, 226.
        field corn, 147.
        fig, 164.
        Gladiolus sp., 271.
        Iris spp., 274.
        Lathyrus odoratus, 276.
        lettuce, 212.
        Lilium spp., 277.
        mulberry, 173.
        Narcissus sp., 278.
        Nepeta cataria, 278.
        Paeonia albiflora, 280.
        pea, 224.
        peach, 161.
        pepper, 201.
        Petunia hybrida, 280.
        Physalis sp., 281.
        potato, 56, 230.
        pumpkin, 207.
        raspberry, 182.
        rhubarb, 226.
        Rosa spp., 284.
        Sapindus sp., 285.
        snap beans, 62, 63.
        soybean, 152.
        spinach, 232.
        squash, 207.
        sugar cane, 239.
        summer squash, 207.
        sweet potato, 211.
        tobacco, 237.
        tomato, 217.
        Tulipa sp., 287.
        turnip, 200.
        Ulmus spp., 259.
        Viola sp., 288.
        watermelon, 203.
        wheat, 144.
        Zantedeschia sp., 289.

Mosaic (virus), Zinnia elegans, 289.
Mosaic, western, celery, 193.
Mouse ear (undet.), pecan, 188.
Mycosphaerella arbuticola, Arbutus menziesii, 242.
    brassicicola, Brussels sprouts, 199.
        cabbage, 198.
    chimaphilina, Chimaphila corymbosa, 84.
    citrullina, cantaloupe, 204.
        cucumber, 205.
        pumpkin, 207.
        squash, 206.
    colorata, Kalmia latifolia, 274.
    fragariae, strawberry, 75, 164.
    gossypina, cotton, 234.
    pachyasca, Heuchera glabella, 84.
    pachystimae, Pachystima myrsinites, 84.
    pinodes, pea, 65, 66, 223.
    pomi, apple, 169.
        quince, 163.
    rubi, blackberry, 180.
        dewberry, 180.
        logan blackberry, 181.
        raspberry, 182.
        Rubus sp., 84.
        youngberry, 183.
    rubina, blackberry, 180.
        raspberry, 182.
    sentina, pear, 178.
Myrothecium roridum, Antirrhinum majus, 261.
Myxosporium corticolum, apple, 169.

N

Necrotic ring mosaic (virus), broccoli, 196.
    Brussels sprouts, 199.
    cauliflower, 197.
Nectria spp., basswood, 256.
    Betula spp., 242.
        lutea, 242.
        populifolia, 242.
    Liriodendron tulipifera, 247.
    poplar, 251.
Nectria spp., Quercus spp., 254.
        Ulmus spp., 258.
    cinnabarina, beech, 245.
        Cydonia japonica, 268.
        Ulmus parvifolia, 258.
    ditissima, Acer palmatum, 240.
            platanoides, 240.
            pseudoplatanus, 240.
            saccharinum, 240.
            saccharum, 240.
        basswood, 256.
        horsechestnut, 241.
Net necrosis, potato, 231.
Nummularia discreta, apple, 169.
    punctulata, Quercus nigra, 254.
Nyssopsora echinata, Ligusticum leibergii, 93.

O

Oedema, cabbage, 199.
    pear, 179.
    Pelargonium sp., 280.
Oidium sp., Euonymus sp., 270.
        Lagerstroemia sp., 275.
        Phlox sp., 280.
        Viburnum sp., 288.
Olpitrichum carpophilum, cotton, 234.
Oospora lactis, nectarine, 162.
Ophiobolus sp., rice, 137.
    graminis, Triticum aestivum, 85.
        wheat, 85, 141.
Ovularia lolii, Lolium perenne, 156.
    viciae, Vicia americana, 88.

P

Penicillium spp., apple, 169.
        field corn, 145, 146, 147.
        sorghum, 139.
        squash, 206.
        strawberry, 164.
        sweet corn, 148.
        Symphoricarpos sp., 286.
    expansum, apple, 169.
        pear, 178.
    gladioli, Gladiolus sp., 271.

Peridermium balsameum, Abies balsamea, 240.
Peronospora sp., cowpea, 154.
    destructor, onion, 190.
    effusa, Chenopodium album, 81.
        spinach, 231.
    manshurica, soybean, 152.
    parasitica, broccoli, 196.
        cabbage, 198.
        cauliflower, 196.
        Lepidium sp., 276.
        radish, 225.
        rutabaga, 195.
    schachtii, beet, 194.
    sparsa, Rosa sp., 81.
    tabacina, tobacco, 236.
    trifoliorum, alfalfa, 149.
        Medicago sativa, 81.
        Trifolium pratense, 152.
    viciae, pea, 223.
        Pisum sativum, 81.
Pestalozzia sp., Rosa spp., 283.
    funerea, Cupressus arizonica, 244.
            pyramidalis, 244.
            sempervirens, 244.
        Euonymus sp., 270.
        Juniperus spp., 247.
    guepini, Camellia japonica, 265.
        Ligustrum sp., 276.
        Magnolia spp., 247.
        Rhododendron spp., 282.
    macrotricha, Rhododendron spp., 282.
Peziza vesiculosa, cabbage, 198.
Phleospora maculans, mulberry, 173.
Phlyctaena linicola, flax, 136.
Pholiota adiposa, basswood, 256.
Phoma sp., Antirrhinum majus, 261.
        Cydonia japonica, 268.
        Kerria japonica, 275.
        potato, 228.
        Rosa spp., 283.
        Syringa vulgaris, 286.
        Ulmus spp., 259.
        wheat, 141.
    anethi, Anethum graveolens, 191.
    apiicola, celery, 192.
    berberina, Berberis thunbergii, 264.
Phoma betae, beet, 194.
        sugar beet, 68, 239.
    corni, Cornus paniculata, 244.
    destructiva, pepper, 201.
        tomato, 215.
    herbarum, Hymenoclea monogyra, 273.
    lingam, broccoli, 196.
        Brussels sprouts, 199.
        cabbage, 198.
        cauliflower, 196.
    mariea, Lonicera tatarica, 277.
    medicaginis, Medicago sativa, 85.
    persicae, peach, 159.
    pomi, see Mycosphaerella pomi.
    terrestris, leek, 191.
        onion, 189, 190.
    zeicola, field corn, 146.
Phomopsis sp., Acer palmatum, 240.
        Azalea, 263.
        Betula populifolia, 242.
        Gardenia florida, 271.
        Magnolia spp., 247.
        Rhododendron carolinianum, 282.
        Salix spp., 255.
        Taxus hicksi, 256.
        Ulmus americana, 259.
        Vaccinium corymbosum, 183.
        Viburnum opulus, 288.
    callistephi, Callistephus chinensis, 265.
    crustosa, Ilex spp., 246.
    juniperovora, Cupressus sempervirens, 244.
        Juniperus spp., 247.
            virginiana, 247.
    kalmiae, Kalmia latifolia, 274.
    lirella, Vinca minor, 288.
    oblonga, Ulmus americana, 259.
            glabra camperdowni, 259.
    vexans, eggplant, 226.
Phony peach (virus), peach, 161.
Phoradendron flavescens, hackberry, 243.
        Maclura pomifera, 247.
        Prosopis glandulosa, 252.
Phragmidium sp., Rosa spp., 283.
    disciflorum, Rosa sp., 93.
    ivesiae, Potentilla blaschkeana, 93.

Phragmidium montivagum, Rosa spp.,93,283.
occidentale, Rubus parviflorus, 93.
peckianum, Rubus bartonianum, 93.
rosae-acicularis, Rosa sp., 93.
Rosa gymnocarpa, 93.
rosae-californicae, Rosa pisocarpa, 93.
rubi-idaei, raspberry, 182.
speciosum, Rosa sp., 93.
subcorticinum, Rosa spp., 283.
Phyllachora sp., Elymus condensatus,156.
trifolii, clover, 152.
Trifolium sp., 84.
pratense, 84.
Phyllactinia corylea, filbert, 186.
Ilex opaca, 246.
Quercus spp., 254.
Phyllosticta sp., bitter almond, 242.
Catalpa spp., 243.
Convallaria majalis, 267.
field corn, 146.
Ilex sp., 246.
Leucothoe catesbaei, 276.
Magnolia spp., 247.
Mahonia aquifolium, 277.
Opuntia sp., 279.
pepper, 201.
acericola, Acer platanoides, 240.
alcides, Populus carolinensis, 251.
antirrhini, Antirrhinum majus, 262.
arnicae, Arnica cordifolia, 262.
bumeliifolia, Bumelia sp., 264.
caryae, pecan, 187.
catalpae, catalpa, 243.
concentrica, Hedera helix, 272.
cookei, Magnolia glauca, 247.
cucurbitacearum, cantaloupe, 204.
gallicola, Solidago missouriensis, 85.
ginkgo, Ginkgo biloba, 245.
globigera, Pyrus sitchensis, 85.
innumerabilis, Amelanchier sp., 261.
labruscae, Ampelopsis sp., 261.
liriodendrica, Liriodendron tulipifera, 247.
maculicola, Cordyline terminalis,267.
magnoliae, Magnolia grandiflora,247.
Phyllosticta mahoniaecola, Mahonia repens, 85.
minima, maple, 240.
ribesicida, Ribes petiolare,85.
saccardoi, Rhododendron spp., 282.
solitaria, apple, 70, 169.
straminella, rhubarb, 225.
virginica, Prunus melanocarpa,252.
pennsylvanica, 252.
viridis, Fraxinus lanceolata, 245.
Phymatotrichum omnivorum, Acer spp.,240.
negundo, 240.
alfalfa, 149.
Althaea rosea, 260.
Antirrhinum majus, 262.
apricot, 173.
Aster sp., 263.
bean, 221.
beet, 194.
Broussonetia papyrifera, 264.
cantaloupe, 204.
carrot, 208.
Cassia artemisioides, 266.
catalpa, 243.
Cercis occidentalis, 243.
chinaberry, 248.
Chrysanthemum hortorum, 266.
cotton, 67, 235.
cowpea, 154.
cucumber, 205.
Cupressus sp., 244.
arizonica, 244.
Dahlia sp., 268.
Delphinium sp., 269.
dewberry, 181.
Dianthus sp., 269.
endive, 202.
Erythrina arborea, 270.
escarole, 202.
Euonymus sp., 270.
Euphorbia marginata, 270.
Gardenia florida, 271.
Ginkgo biloba, 245.
grape, 185.
Helianthus sp., 272.
Hibiscus sabdariffa, 273.
syriacus, 273.

Phymatotrichum omnivorum, Juniperus virginiana, 247.
Lagerstroemia sp., 275.
lettuce, 212.
Ligustrum sp., 276.
Lonicera sp., 277.
Matthiola sp., 277.
mulberry, 173.
Nerium oleander, 279.
okra, 210.
pea, 223.
peanut, 233.
pecan, 188.
pepper, 201.
persimmon, 244.
Physalis sp., 281.
Poinsettia pulcherrima, 281.
poplar, 251.
potato, 228.
Prosopis glandulosa, 252.
Pueraria thunbergiana, 282.
Quercus durandii, 254.
macrocarpa, 254.
phellos, 254.
virginiana, 254.
raspberry, 182.
rhubarb, 225.
Robinia pseudoacacia, 254.
Rosa spp., 284.
Salix babylonica, 255.
discolor, 255.
Sambucus sp., 285.
Schinus molle, 255.
Sesbania sp., 285.
soybean, 152.
sugar beet, 239.
sweet potato, 211.
Syringa vulgaris, 286.
Tilia americana, 256.
turnip, 200.
Ulmus americana, 259.
parvifolia, 259.
Weigela sp., 289.
youngberry, 183.
Physalospora gregaria, Salix spp., 255.
obtusa, apple, 70, 168, 170.
Citrus trifoliata, 267.
Physalospora obtusa, Cydonia japonica, 268.
pear, 178.
persimmon, 244.
quince, 163.
Physarum sp., Cynodon dactylon, 155.
cinereum, alfalfa, 149.
undet. Gramineae, 159.
Physoderma zeae-maydis, field corn, 146.
Physopella fici, fig, 163.
Phytomonas sp., pear, 179.
Phytophthora sp., Antirrhinum majus, 262
ginseng, 238.
Lilium sp., 277.
Lolium spp., 156.
Paeonia sp., 280.
rhubarb, 225.
Senecio cruentus, 285.
tomato, 215.
Zantedeschia sp., 289.
cactorum, peach, 160.
Rhododendron spp., 282.
rhubarb, 225.
citrophthora, almond, 186.
cryptogea, Callistephus chinensis, 265.
infestans, potato, 56, 228.
tomato, 215.
megasperma, cauliflower, 196.
parasitica, rhubarb, 225.
tomato, 215.
nicotianae, tobacco, 236.
phaseoli, bean, 221.
lima bean, 219.
terrestris, see Phytophthora parasitica.
Piricularia grisea, undet. Gramineae, 159.
oryzae, rice, 137.
Plasmodiophora brassicae, broccoli, 196.
cabbage, 198.
cauliflower, 197.
collards, 196.
kohlrabi, 199.
radish, 225.
rutabaga, 195.
turnip, 200.

Plasmopara halstedii, Helianthus sp., 272.
viticola, grape, 185.
Plenodomus destruens, sweet potato, 211.
Pleospora sp., sycamore, 251.
tropaeoli, Tropaeolum majus, 287.
Pleurotus ulmarius, Ulmus spp., 259.
Plowrightia morbosa, cherry, 175.
plum, 176.
Prunus demissa, 84.
melanocarpa, 252.
Podosphaera leucotricha, apple, 170.
oxycanthae, Amygdalus persica, 82.
cherry, 175.
Prunus sp., 82.
pennsylvanica, 82.
Pyrus malus, 82.
Polyporus spp., Quercus spp., 254.
betulinus, Betula populifolia, 242.
conchifer, Ulmus spp., 259.
robiniophilus, Robinia pseudoacacia, 254.
Polyspora lini, flax, 136.
Polystictus versicolor, apple, 170.
Poor germination, cotton, 235.
Powdery mildew (undet.), apricot, 174.
Astilbe arendsii, 263.
(undet.), Euonymus sp., 270.
Pseudomonas sp., Pelargonium sp., 280.
carotae, carrot, 209.
holci, Setaria lutescens, 157.
Pseudoperonospora cubensis, cantaloupe, 204.
cucumber, 205.
gourd, 208.
pumpkin, 207.
squash, 206.
watermelon, 203.
Pseudopeziza medicaginis, alfalfa, 83, 149.
Medicago sativa, 83.
trifolii, Trifolium spp., 152.
pratense, 83, 152.
repens, 152.
Psyllid yellows, potato, 231.
Puccinia absinthii, Artemisia cana, 263.
tridentata, 94.
anomala, barley, 94, 134.
Puccinia anomala, Hordeum vulgare, 94.
antirrhini, Antirrhinum majus, 94, 262.
aristidae, Distichlis stricta, 156.
asparagi, asparagus, 94, 194.
officinalis, 94.
balsamorhizae, Balsamorhiza sagittata, 94.
bistortae, Polygonum bistortoides, 94.
calochorti, Calochortus elegans, 94.
caricis grossulariata, Grossularia inermis, 94.
Ribes sp., 94.
petiolare, 94.
urticata, Carex rostrata, 266.
Urtica dioica, 94.
chrysanthemi, Chrysanthemum sp., 94.
hortorum, 266.
circaeae, Circaea pacifica, 94.
cirsii, Cirsium palousense, 94.
clintonii, Pedicularis groenlandica, 94.
cnici, Cirsium lanceolatum, 95.
coronata, Calamagrostis rubescens, 95.
Cinna latifolia, 95.
Holcus lanatus, 95, 156.
Lolium multiflorum, 156.
oats, 51, 131.
Rhamnus alnifolia, 95.
Shepherdia canadensis, 95.
wild oat, 155.
crandallii, Symphoricarpos sp., 95.
albus, 95.
cyani, Centaurea cyanus, 95.
difformis, Galium aparine, 95.
extensicola, Carex pennsylvanica, 266.
hieraciata, Senecio columbianus 95.
gentianae, Gentiana parryi, 95.
glumarum, Agropyron cristatum, 95.
Bromus marginatus, 95.
rubens, 95.
vulgaris, 81.

Puccinia glumarum, Elymus condensatus,
95.
glaucus, 95.
Festuca octoflora, 95.
Hordeum jubatum, 95.
nodosum, 96.
vulgare, 96.
Hystrix californica, 96.
Triticum aestivum, 96.
compactum, 96.
graminis, Agropyron inerme, 154.
pauciflorum, 154.
repens, 154.
smithii, 154.
spicatum, 154.
barley, 48.
Berberis vulgaris, 96.
Bromus marginatus, 155.
Elymus canadensis, 96, 156.
condensatus, 156.
glaucus, 96.
Hordeum jubatum, 96, 156.
nodosum, 156.
vulgare, 96.
oats, 51.
redtop, 154.
rye, 50.
Sporobolus cryptandrus, 158.
wheat, 46, 141.
avenae, Avena sativa, 96.
oats, 9, 96, 131.
phlei-pratensis, Phleum pratense,
96, 157.
poae, Poa bulbosa, 157.
pratensis, 157.
secalis, rye, 9, 138.
tritici, barley, 9, 134.
Triticum aestivum, 96.
wheat, 19, 31.
helianthi, artichoke, Jerusalem, 209.
Helianthus sp., 96.
angustifolius, 272.
annuus, 272.
nana, 272.
heterospora, Althae rosea, 260.
Anoda lavateroides, 261.
heucherae, Mitella pentandra, 278.
Puccinia heucherae, Mitella staurepetal
96.
Tiarella unifoliata, 96.
hieracii, Hieracium albiflorum, 96.
Taraxacum officinale, 96, 287.
interveniens, Sidalcea crenulata,
96.
iridis, Iris spp., 274.
jonesii typica, Leptotaenia
multifida, 97.
malvacearum, Althaea rosea, 97, 260.
Malva rotundifolia, 97.
menthae, Salvia splendens, 284.
mesomajalis, Clintonia uniflora, 97.
mcclatchieana, Scirpus microcarpus,
97.
minussensis, Lactuca pulchella, 97.
obscura, Luzula campestris, 97.
oenotherae, Sphaerostigma contortum
97.
ortonii, Dodecatheon pauciflorum, 97
parkerae, Ribes lacustre, 97.
pattersoniana, Sitanion jubatum, 97
pentstemonis, Pentstemon triphyllus
97.
peridermiospora, Fraxinus americana
245.
phragmitis, Phragmites communis, 157
rhubarb, 225.
pimpinellae, Osmorrhiza brevipes, 98
plumbaria, Microsteris gracilis, 98.
humilis, 98.
podophylli, Podophyllum peltatum,
281.
polygoni-amphibii persicariae,
Polygonum muhlenbergii,
98.
porphyrogenita, Cornus canadensis,
98.
porri, Allium schoenoprasum, 98.
pulsatillae, Trautvetteria grandis,
98.
purpurea, sorghum, 139.
halepense, 158.
vulgare sudanense, 158.
ribis, Ribes triste, 98.
rubigo-vera agropyri, Aquilegia
formosa, 98.

Puccinia rubigo-vera agropyri, Clematis ligusticifolia, 98.
Delphinium nelsonii, 98.
Viorna hirsutissima, 98.
agropyrina, Agropyron repens, 98, 154.
violaceaum, 154.
apocrypta, Hydrophyllum albifrons, 98.
Mertensia lanceolata, 98.
subcordata, 98.
secalis, rye, 50, 99, 138.
Secale cereale, 99.
tritici, Triticum aestivum, 99.
compactum, 99.
wheat, 31, 46, 99, 142.
sambuci, Sambucus sp., 285.
schedonnardi, cotton, 234.
sorghi, field corn, 146.
sweet corn, 148.
splendens, Hymenoclea monogyra, 273.
stipae, Chrysothamnus sp., 99.
triticina, see P. rubigo-vera tritici.
vagans epilobii-tetragoni, Epilobium paniculatum, 99.
violae, Viola sp., 99.
adunca, 99.
canadensis, 99.
glabella, 99.
odorata, 288.
xanthii, Xanthium speciosum, 99.
Pucciniastrum americanum, raspberry, 182.
goeppertianum, Vaccinium sp., 92.
myrtillus, 287.
myrtilli, hemlock, 256.
Vaccinium macrophyllum, 92.
Pyrenopeziza medicaginis, alfalfa, 150.
Medicago sativa, 83.
Pyrenophora teres, barley, 48, 134.
Pythium spp., alfalfa, 150.
bean, 221.
beet, 195.
cabbage, 198.
cotton, 235.
field corn, 145, 146.
flax, 136.
onion, 190.
Pythium spp., pea, 223.
Pinus sp., 250.
radish, 225.
spinach, 232.
tobacco, 236.
aphanidermatum, radish, 225.
arrhenomanes, sorghum, 139.
sugar cane, 239.
debaryanum, beet, 195.
cantaloupe, 204.
celery, 192.
cucumber, 205.
flax, 136.
Gypsophila alba, 272.
mangel, 195.
pepper, 201.
Polianthes tuberosa, 281.
Solanum tuberosum, 80.
sugar beet, 239.
tobacco, 236.
ultimum, sweet potato, 211.

R

Ramularia sp., Viola sp., 288.
armoraciae, horseradish, 224.
arnicalis, Arnica cordifolia, 88.
diervillae, Weigela sp., 289.
pastinacae, parsnip, 219.
primulae, Primula parryi, 282.
taraxaci, Taraxacum officinale, 88, 287.
tulasnei, Fragaria bracteata, 88.
platypetala, 88.
vallisumbrosae, Narcissus sp., 278.
variata, Mentha canadensis borealis, 88.
Ravenelia arizonica, Prosopis glandulosa, 252.
Red suture (virus), peach, 162.
tip (frost injury), oats, 132.
Rehmiellopsis bohemica, Abies balsamea, 240.
lasiocarpa, 240.
Rhabdocline pseudotsugae, Douglas fir, 252.
Rhizina inflata, Pinus glauca, 250.

Rhizina inflata, Pinus resinosa, 250.
Rhizoctonia sp., alfalfa, 150.
asparagus, 194.
beet, 195.
Begonia sp., 263.
cabbage, 198.
Centaurea cyanus, 266.
cotton, 234.
cowpea, 154.
flax, 135, 136.
Foeniculum vulgare, 209.
Hibiscus sabdariffa, 273.
Lilium spp., 277.
Matthiola incana, 277.
okra, 210.
Phlox paniculata, 280.
Picea rubra, 248.
Pinus sp., 250.
Poa pratensis, 157.
potato, 56.
Primula sp., 282.
radish, 225.
rhubarb, 226.
spinach, 232.
strawberry, 164.
Tagetes sp., 286.
Tropaeolum majus, 287.
watermelon, 203.
Zinnia elegans, 289.
batatícola, bean, 221.
cantaloupe, 204.
cowpea, 154.
Lilium philippinensis, 277.
sorghum, 139.
sweet potato, 211.
Zinnia elegans, 289.
crocorum, alfalfa, 150.
sweet potato, 211.
solani, Clarkia sp., 267.
Dianthus caryophyllus, 269.
Gypsophila alba, 272.
Matthiola sp., 277.
see also Corticium vagum.
tuliparum, Tulipa sp., 287.
Rhizopus sp., field corn, 146, 147.
squash, 206.
nigricans, cantaloupe, 204.
Rhizopus nigricans, onion, 190.
strawberry, 165.
sweet potato, 211.
Rhynchosporium secalis, barley, 88, 134.
Hordeum vulgare, 88.
rye, 138.
Rhytisma sp., Quercus virginiana, 254.
acerinum, Acer spp., 241.
rubrum, 241.
saccharinum, 241.
spicatum, 241.
liriodendri, Liriodendron tulipifera, 247.
punctatum, Acer spp., 241.
rubrum, 241.
saccharum, 241.
spicatum, 241.
solidaginis, Solidago canadensis, 236.
Ring spot (virus), Dahlia sp., 263.
pepper, 201.
tobacco, 238.
Root rots, carrot, 209.
corn, 52.
dry beans, 64.
field corn, 147.
flax, 136.
grape, 185.
green peas, 65, 66.
horseradish, 225.
Lilium longiflorum giganteum, 277.
Narcissus sp., 278.
snap beans, 62, 63.
strawberry, 75, 165.
wheat, 140.
Rootstock decay (Bacterial), Iris spp., 274.
Rosette (undet.), apple, 172.
(virus), peach, 162.
(non-par.), pecan, 188.
Rough bark (non-par.), pear, 179.
Rugose mosaic (virus), potato, 230.
Russet fruit (undet.), grape, 185.

S

Sacidum ulmifoliae, Ulmus parvifolia, 259.
Schizophyllum sp., apple, 170.
Sclerospora graminicola, Setaria viridis, 157.
Sclerotinia sp., Aquilegia sp., 262.
Pisum sativum, 83.
prune, 174.
betulae, Betula nigra, 242.
carunculoides, mulberry, 173.
cinerea, almond, 186.
apricot, 174.
prune, 174.
demissa, Prunus demissa, 252.
fructicola, apricot, 174.
cherry, 73, 175.
Cydonia japonica, 268.
nectarine, 162.
peach, 72, 160.
pear, 178.
plum, 176.
Prunus glandulosa, 252.
gladioli, Gladiolus sp., 271.
minor, potato, 228.
sclerotiorum, Antirrhinum majus, 262.
apricot, 174.
bean, 221.
cabbage, 198.
Calendula officinalis, 265.
carrot, 208.
cauliflower, 197.
celery, 192.
collards, 196.
cucumber, 205.
endive, 202.
flax, 136.
Helianthus sp., 272.
lettuce, 212.
Matthiola sp., 278.
Melilotus alba, 151.
indica, 151.
parsnip, 219.
pea, 224.
pepper, 201.
potato, 228.
strawberry, 165.
tomato, 215.
Sclerotinia trifoliorum, alfalfa, 150.
Medicago sativa, 83.
Melilotus alba, 83.
Trifolium spp., 153.
hybridum, 83.
incarnatum, 153.
medium, 153.
pratense, 83, 153.
vaccinii, Vaccinium corymbosum, 184.
Sclerotium, cotton, 234.
cepivorum, onion, 190.
delphinii, Aquilegia vulgaris, 262.
Delphinium sp., 269.
Hosta subcordata grandiflora, 273.
Lupinus sp., 277.
Phlox paniculata, 280.
Physostegia virginiana, 281.
Potentilla canadensis, 282.
Viola sp., 288.
oryzae, rice, 137.
rhizodes, undet. Gramineae, 159.
rolfsii, Antirrhinum majus, 262.
artichoke, Jerusalem, 210.
bean, 221.
beet, 195.
cabbage, 198.
Calendula officinalis, 265.
cantaloupe, 204.
carrot, 208.
cotton, 235.
cowpea, 154.
cucumber, 205.
Delphinium sp., 269.
eggplant, 226.
endive, 202.
escarole, 202.
Iris spp., 274.
mangel, 195.
Mitchella repens, 278.
onion, 190.
peanut, 233.
pepper, 201.
potato, 229.
soybean, 152.
sweet clover, 151.
sweet potato, 211.
tobacco, 236.

Sclerotium rolfsii, tomato, 215.
tung oil tree, 242.
wheat, 142.
Scolecotrichum graminis, Bromus carinatus, 155.
Cinna latifolia, 89.
Elymus canadensis, 156.
Hordeum jubatum, 89.
nodosum, 89.
Lolium spp., 156.
wild barley, 156.
Scorch, pea, 224.
Scorias spongiosa, beech, 245.
Selenium injury, Rosa spp., 284.
Septobasidium sp., Ulmus crassifolia, 259.
retiforme, pear, 178.
Septoria sp., barley, 134.
Lolium spp., 156.
Phlox sp., 281.
poplar, 251.
acicola, Pinus sp., 250.
apii, celery, 192.
graveolentis, celery, 192.
asaricola, Asarum caudatum, 85.
azaleae, Azalea spp., 263.
indica, 263.
hinodegiri, 263.
occidentalis, 263.
bromigena, Bromus inermis, 155.
chrysanthemella, Chrysanthemum hortorum, 267.
cornicola, Cornus florida, 244.
cucurbitacearum, cantaloupe, 204.
fairmani, Althaea rosea, 260.
fraxini, ash, 245.
gladioli, Gladiolus sp., 271.
graminum, Dactylis glomerata, 155.
grossulariae, Ribes lacustre, 85.
hyalina, Viola glabella, 85.
lactucae, lettuce, 212.
lycopersici, tomato, 58, 60, 215.
magnoliae, Magnolia grandiflora, 247.
menthicola, Mentha canadensis, 85.
nodorum, wheat, 142.
obesa, Chrysanthemum hortorum, 267.
Septoria oxyspora culmorum, Dactylis glomerata, 86.
paeoniae berolinensis, Paeonia sp., 280.
passerinii, wild barley, 156.
pisi, pea, 224.
populicola, poplar, 252.
rumicis, Rumex crispus, 86.
streptopidis, Disporum majus, 86.
tritici, Triticum aestivum, 86.
wheat, 86, 143.
verbascicola, Verbascum blattaria, 288.
Sheath spot (undet.), oats, 132.
Shot hole (undet.), plum, 177.

Shrivel (undet.), filbert, 187.
Slime mold, undet. Gramineae, 158.
Sorosporium reilianum, field corn, 146.
sorghum, 139.
syntherismae, Cenchrus tribuloides, 90.
Panicum miliaceum, 90.
Sphaceloma rosarum, Rosa spp., 284.
violae, Viola odorata, 288.
Sphacelotheca andropogonis, Andropogon furcatus, 154.
scoparius, 154.
sorghi, sorghum, 139.
halepense, 158.
Sphaerella rumicis, Rumex obtusifolius, 84.
Sphaerographium fraxini, Fraxinus americana, 245.
Sphaeropsis sp., Abies concolor, 240.
Cedrus deodara, 243.
Fraxinus americana, 245.
Ilex spp., 246.
Sorbus sp., 256.
Ulmus americana, 259.
ellisii, Douglas fir, 252.
Pinus montana, 250.
nigra, 250.
resinosa, 250.
sylvestris, 250.
malorum, Abies concolor, 240.

Sphaeropsis salicis, Salix spp., 255.
Sphaerotheca sp., Rosa spp., 284.
spp., Taraxacum officinale, 287.
castagnei, Geranium viscosissimum, 82.
Taraxacum officinale, 287.
humuli, blackberry, 180.
Forsellesia spinescens, 82.
hops, 235.
Polemonium micranthum, 82.
raspberry, 182.
Rosa spp., 284.
Senecio sp., 285.
strawberry, 165.
Taraxacum officinale, 287.
fuliginea, Taraxacum officinale, 82.
mors-uvae, Ribes sp., 82.
pannosa, nectarine, 162.
peach, 160.
Rosa spp., 82, 284.
Spindle tuber (virus), potato, 230.
Spindling sprout, potato, 231.
Spondylocladium atrovirens, potato, 89, 229.
Solanum tuberosum, 89.
Spongospora subterranea, potato, 229.
Sporocybe azaleae, azalea, 263.
Sporodesmium scorzonerae, salsify, 232.
Spotted wilt (virus), Callistephus chinensis, 265.
lettuce, 212.
pepper, 201.
tomato, 218.
Tropaeolum majus, 287.
Vicia faba, 153.
Zantedeschia sp., 289.
Spray injury, apple, 172.
plum, 177.
Stagonospora sp., Juniperus virginiana, 247.
atriplicis, Chenopodium album, 86.
curtisii, Narcissus sp., 278.
Stalk rots, corn, 52.
field corn, 147.
Steganosporium pyriforme, Acer platanoides, 241.
Stem end rot (undet.), potato, 231.
Stem rot (undet.), Gardenia florida, 271.
(undet. fungus), Senecio cruentus, 285.
rust epidemic of 1935 in Kansas, 19-30.
rust epidemic of 1935 in Nebraska, 1-18.
rust epidemic in North Texas, 31-41.
Stereum sp., apple, 170.
spp., Quercus spp., 254.
purpureum, apple, 170.
cherry, 175.
pear, 178.
prune, 174.
Salix spp., 255.
Stilbum cinnabarinum, fig, 163.
Storage rots, sweet potato, 55, 211.
Straight head (undet.), rice, 137.
Streak (virus), pea, 224.
potato, 230.
raspberry, 183.
tomato, 218.
vetch, 153.
Stripe (virus), field corn, 147.
Strumella sp., beech, 245.
hickory, 245.
Ostrya virginiana, 248.
sour gum, 248.
canker, Castanea dentata, 243.
coryneoidea, Quercus spp., 254.
Stunt (virus), Delphinium sp., 269.
Sulphur dioxide injury, Lathyrus odoratus, 276.
Sun scald (non-par.), apple, 172.
filbert, 187.
Juglans regia, 189.
pepper, 202.
potato, 231.
Suspected mosaic, strawberry, 166.

T

Taphrina sp., Acer spp., 241.
saccharum, 241.
Betula lutea, 242.
Prunus besseyi, 252.
aurea, Pinus nigra italica, 252.
cerasi, cherry, 175.

Taphrina coerulescens, Quercus spp.,254.
deformans, cherry, 175.
peach, 72, 160.
mirabilis, plum, 176.
pruni, plum, 177.
Testicularia cyperi, Rynchospora corniculata, 284.
Thelephora retiformis, hackberry, 243.
terrestris, Pinus sp., 250.
Thielaviopsis basicola, Lathyrus odoratus, 275.
onion, 190.
tobacco, 237.
Thyrospora sarcinaeformae, alfalfa, 150.
Tilletia spp., wheat, 46.
buchloeana, buffalo grass, 155.
guyotiana, Bromus mollis, 91.
horrida, rice, 137.
laevis, Triticum aestivum, 91.
wheat, 143.
tritici, Triticum aestivum, 91.
wheat, 143.
Tipburn, cabbage, 199.
filbert, 187.
potato, 57, 230.
Titea spp., Lolium spp., 156.
Tolyposporella nolinae, Nolina macrocarpa, 279.
Trabutia erythrospora, Quercus virginiana, 254.
Tranzschelia pruni-spinosae, Anemone coronata, 261.
apricot, 174.
ornamental peach, 242.
peach, 160.
plum, 177.
Trichothecium lignorum, azalea, 263.
Tubercularia fici, fig, 163.
nigricans, Ampelopsis aconitifolia, 261.
Tubers but no tops (non-par.), potato, 231.
Typhula graminum, Agropyron cristatum, 100.
Dactylis glomerata, 100.
Hordeum vulgare, 100.
Triticum aestivum, 100.

U

Uncinula circinata, maple, 241.
Sapindus sp., 285.
flexuosa, horsechestnut, 241.
necator, grape, 185.
Psedera quinquefolia, 82.
polychaeta, hackberry, 243.
salicis, Salix spp., 255.
Uredinopsis macrosperma, Pteridium aquilinum pubescens,92.
struthiopteridis, Athyrium cyclosorum, 92.
Urocystis carcinodes, Actaea rubra, 91.
cepulae, onion, 190.
occulta, rye, 50, 138.
trillii, Trillium ovatum, 91.
tritici, wheat, 143.
Uromyces spp., clover, 153.
caryophyllinus, Dianthus sp.,99,269.
caryophyllus, 269.
elegans, Trifolium carolinianum,153.
fabae, Lathyrus bijugatus, 99.
pea, 224.
Vicia faba, 153.
heterodermus, Erythronium grandiflorum, 99.
medicaginis, alfalfa, 150.
minor, Trifolium parryi, 153.
phaseoli typica, bean, 221.
dry beans, 64.
snap beans, 62, 63.
polygoni, Polygonum aviculare, 99.
primaveralis, Nothoscordium bivalve, 279.
probus, Olsynium grandiflorum,100.
proeminens, Poinsettia pulcherrima, 281.
rudbeckiae, Rudbeckia occidentalis, 100.
spermacoces, Abutilon, 260.
trifolii fallens, Trifolium spp., 153.
pratense, 100, 153.
subterraneum, 153.
hybridi, Trifolium hybridum, 100, 153.

Uromyces trifolii trifolii-repentis,
Trifolium repens, 100.
vignae, cowpea, 154.
zygadeni, Zygadenus venenosus, 100.
Ustilago spp., barley, 48.
avenae, Avena sativa, 90.
oats, 51, 132.
bouteloua, blue grama, 155.
bromivora, Bromus carinatus, 90.
marginatus, 90.
tectorum, 90, 155.
crameri, Setaria italica, 157.
cynodontis, Cynodon dactylon, 155.
echinata, Phalaris arundinacea, 157.
hordei, barley, 48, 134.
Hordeum vulgare, 90.
hypodytes, Poa ampla, 157.
ischaemi, Andropogon scoparius, 155.
levis, Avena sativa, 91.
oats, 51, 132.
lorentziana, Hordeum jubatum, 91.
nodosum, 91.
wild barley, 156.
medians, barley, 135.
neglecta, Setaria lutescens, 157.
nigra, barley, 135.
nuda, barley, 135.
Hordeum vulgare, 91.
oxalidis, Oxalis corniculata, 279.
perennans, Arrhenatherum elatius, 91.
striaeformis, Elymus sp., 91.
undet. Gramineae, 159.
Elymus virginicus, 156.
Phleum pratense, 91.
tritici, Triticum aestivum, 91.
wheat, 46, 143.
zeae, corn, 52.
field corn, 146.
sweet corn, 54, 148.
Ustulina vulgaris, Tilia americana, 256.

V

Valsa leucostoma, plum, 177.
Salix spp., 255.
Valsaria insitiva, redbud, 243.
Variegation, strawberry, 166.
Venturia sp., Pyracantha spp., 282.
inaequalis, apple, 70, 170.
Pyrus malus, 84.
pyrina, pear, 69, 178.
Vermicularia phlogina, Phlox subulata, 281.
Verticillium sp., Acer palmatum, 241.
platanoides, 241.
rubrum, 241.
saccharum, 241.
Coleus sp., 267.
cotton, 235.
peppermint, 236.
strawberry, 165.
tomato, 216.
Ulmus spp., 259.
albo-atrum, azalea, 263.
blackberry, 180.
cotton, 235.
eggplant, 226.
okra, 210.
potato, 229.
raspberry, 182.
Senecio cruentus, 285.
tomato, 216.
dahliae, Acer macrophyllum, 241.
platanoides, 241.
Antirrhinum majus, 262.
Berberis thunbergii, 264.
Chrysanthemum frutescens, 266.
hortorum, 267.
tomato, 216.
Venidium sp., 288.
Viroses, miscellaneous, potato, 230.
Virus diseases, celery, 193.
peach, 72.
Volutella sp., Pachysandra terminalis, 279.
buxi, Buxus sempervirens, 264.

W

Water core (non-par.), apple, 172.
Weather injury, bean, 222.
cucumber, 206.
filbert, 187.
Juglans regia, 188.

Weather injury, onion, 191.
pea, 224.
peach, 162.
pear, 179.
plum, 177.
prune, 174.
raspberry, 183.
strawberry, 166.
turnip, 200.
Western yellow blight, see curly top.
Whiptail (non-par.), cauliflower, 197.
White spot (non-par.), alfalfa, 151.
tip (undet.), rice, 137.
Wilt (undet.), Matthiola sp., 278.
pineapple, 162.
Senecio cruentus, 285.
Winter injury, alfalfa, 151.
apple, 173.
apricot, 174.
Berberis thunbergii, 264.
blackberry, 180.
cherry, 176.
Cydonia japonica, 268.
Forsythia sp., 270.
grape, 185.
Hedera helix, 272.
Ligustrum ibota, 276.
Pinus taeda, 250.
youngberry, 183.
killing, strawberry, 166.
sun scald, Camellia japonica, 265.
Witches broom, alfalfa, 150.
cherry, 176.
Pinus resinosa, 250.
Witches broom, strawberry, 165.

X

"X" disease (undet.), peach, 162.
Xanthosis, strawberry, 166.
Xylaria mali, apple, 171.
polymorpha, apple, 171.

Y

Yellow dwarf (virus), onion, 191.
potato, 230.
heart (non-par.), potato, 231.
leaf, strawberry, 166.
top (non-par.), alfalfa, 151.
Yellows (Fusarium), celery, 193.
(leaf hopper), alfalfa, 151.
(unknown), Viola tricolor, 288.
(virus), Calendula officinalis, 265.
Callistephus chinensis, 265.
carrot, 209.
(virus, California aster yellows), celery, 193.
(virus), celery, 193.
lettuce, 212.
peach, 162.
salsify, 232.
spinach, 232.
strawberry, 165.

Z

"Z" disease (Fusarium sp.?), potato, 228.